SUSTAINABLE HOSPITALITY

DIGITALISATION GUIDEBOOK

for VET Learners and Professionals
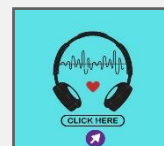
SUSTAINABLE
HOSPITALITY
DIGITALISATION
TOOLKIT

2023

PREPARED BY:

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City Unity College Nicosia
DigitalGuest APS
INERCIA DIGITAL SL

Co-funded by the European Union · HOTEL SCHOOL HOTEL MANAGEMENT COLLEGE · City UNITY College NICOSIA · ITALIAN HOSPITALITY SCHOOL · Dania ERHVERVSAKADEMI · inerciadigital Boost your digital skills · digital guest

SUSTAINABLE HOSPITALITY DIGITALISATION GUIDEBOOK

IS USEFUL FOR:

- Initial and continuous VET learners,
- Hospitality industry employees: Learners, Hospitality Professionals in line with individual needs and expectations of the employers and labour market to better support competitiveness and employment in the hospitality industry at regional and local level;
- amateurs to update information on digitalization for sustainable hospitality;

Abstract

The educational material explains how to learn sustainable hospitality digitally and advance digital skills, how to infuse digitalisation in hospitality working environments, how to measure sustainable hospitality digitalisation. The guidebook includes a set of collected international practices and case studies of sustainable hospitality digitalisation and existing market offers for digitalisation of hospitality leading to sustainability.

Additionally, it is an informative tool for the tourists and hospitality customers to learn about existing market offers and the use of digital applications, devices, ICT systems, guest services, and other to extend knowledge and skills on use and consumption of the offers involving digitalization in the market of the hospitality industry.

Hyperlink:

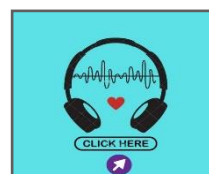http://www.sustainable-hospitality-digitalisation-toolkit.com/

Table of Contents

I Description of the project, the aim and the objectives of the project

The Project Results: Innovative Open Educational Resources: Sustainable Hospitality Digitalisation Toolkit

PR1 Sustainable Hospitality Digitalisation Guidebook for VET Learners and Professionals (initial, continuous learners);

PR2 'Pedagogy of Sustainable Hospitality Digitalisation' for VET Educators and hospitality business field coaches and team leads,

PR3 digital course 'Sustainable Hospitality Digitalisation Toolkit' with materials;

PR4 Series of Webinars on 'Sustainable Hospitality Digitalisation'

KA220-VET Cooperation partnership in vocational education and training 'Sustainable Hospitality Digitalisation Toolkit' in the field of VET (both initial and continuing) is aimed to

enhance access to training and qualifications for all by support to pooling of resources, and providing initial and/or continuing training to the staff, further strengthen key competences in initial and continuing VET, in particular digital skills, green skills, employability.

The Project Objectives:

- Develop Sustainable Hospitality Digitalisation Guidebook for initial and continuous VET Learners;
- Provide practical guidelines 'Pedagogy of Sustainable Hospitality Digitalisation' to VET Educators and coaches of initial and continuous professional hospitality education;
- Produce digital course 'Sustainable Hospitality Digitalisation Toolkit ' with teaching and learning resources for initial and continuous VET education and professional field workshops;
- Produce series of webinars to demonstrate how to use the resources and the course by the educators and learners from the two perspectives, and produce reviews on related to sustainable digitalisation subtopics;
- Improve VET educators' knowledge on hospitality digitalisation and approaches to embed digitalisation in the units;
- Mobilise social capital to raise awareness and promote the need to improve digital and digitalisation skills in Hospitality VET education and in the hospitality industry;
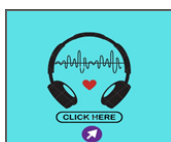
Improve the intellectual and digitalisation competence of the project The project consortium consists of the six participants:

Table 1: Partners

COUNTRY	PARTNER NAME	WEBSITES
Latvia	SIA "HOTEL SCHOOL" Viesnīcu biznesa koledža /"HOTEL SCHOOL" Hotel Management College OID E10176704	www.hotelschool.lv
Denmark	ERHVERVSAKADEMI DANIA (Dania Academy) OID E10102026	www.eadania.dk
Italy	Italian Hospitality School SRL OID E10242654	www.hoschool.it
Cyprus	City Unity College Nicosia OID E10155506	www.cityu.ac.cy
Sweden	DigitalGuest APS OID E10277526	www.digitalguest.com
Spain	INERCIA DIGITAL SL OID E10145080	www.inerciadigital.com

The project consortium applied with the project proposal because each participant is interested in its performance for own needs, national, regional needs for such cooperation and development of useful qualitative resources and advancing these organisations during the cooperation and after. The project will meet the needs of each participant: to advance own representation in the market, apply own competence, merge the competences and develop the project results of demand in all partnership countries and other EU countries.
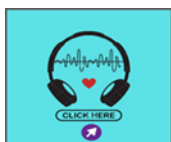
II Description of the Project Partners

'Sustainable Hospitality Digitalisation Toolkit''
ERASMUS+ PROJECT 2021-1-LV01-KA220-VET-000033140
www.sustainablehospitalitydigitalisation.toolkit.com

SIA "HOTEL SCHOOL" Viesnīcu biznesa koledža
Country: Latvia, Riga   www.hotelschool.lv
Description: The project coordinator
HOTEL SCHOOL Viesnīcu biznesa koledža SIA (HOTEL SCHOOL Hotel Management College LLC), established in 2010, is VET provider, an accredited HE institution, provider of 1st Level professional higher education (college) and the 4th Level professional qualification (LQF and EQF Level 5) in Hospitality Management. In addition, BTEC Level 5 Higher National in Business, in Hospitality Management/CA. HOTEL SCHOOL holds Erasmus ECHE, VET and ADULT educations accreditations.. HOTEL SCHOOL has developed good cooperation with employers who ensure internship opportunities for students and learners as well as employ HOTEL SCHOOL graduates. HOTEL SCHOOL is experienced partner in the development of the methodologies, competency frameworks and professional standards. HOTEL SCHOOL has VET experience, competence in design and providing VET education, using digital systems in learning environment. The school applies digital technologies in the study process and is able to create, apply the new course and methods to develop and apply digital skills by educators, staff, learners, current and potential employers and partners. HOTEL SCHOOL runs totally digitalised education system, which is applicable both for in-class learning and out-of-class learning.

ERHVERVSAKADEMI DANIA (Dania Academy)
Country: Denmark   www.eadania.dk
Description: The project partner
Dania Academy is a modern higher-education centre offering applied degrees at undergraduate level. The
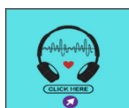
campusses are located in seven cities across the Central Denmark Region. The student body consists of 2.800 full-degree students, and we have more than 3.000 part-time students. Dania offers 21 undergraduate programmes. According to the Danish national qualification framework, Dania Academy is comparable to a university of applied sciences and has awarding powers at bachelor's level. Fields of education are business, tourism and hospitality, IT & Game development, Technology & Health.

DigitalGuest APS

Country: Sweden   www.digitalguest.com

Description: The project partner

DigitalGuest (www.digitalguest.com) started as a digital guest directory and has turned into a powerful communication, upselling and guest service platform for the hospitality industry. The platform is used by more than 200 hotels, vacation houses, camp sites, hostels and more in 14 different countries, and the company did grow extremely during the COVID- 19 pandemic. DigitalGuest has daily contact to the hospitality industry and is considered expert in the digital field of the industry, as they are Scandinavian leaders in guest service, upselling, communication and guest data. The key persons in this project are heavy on the knowledge of digital solutions and possibilities in the hospitality industry, and have also been working for many years in hotels. Digital Guest have a proven platform that has been running on many hotels and creating value in the operation of the hotel for several years. The platform is tailored and unique to the hospitality industry. High knowledge about the digital solutions and possibilities in the hospitality industry on all areas.

City Unity College Nicosia

Country: Cyprus, Nicosia   www.cityu.ac.cy

Description: The project partner

City Unity College Nicosia was established in April of 2014 and started its operation in September of 2014. The college currently offers 14 programs (diplomas, bachelors and masters) in various fields of study and
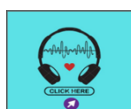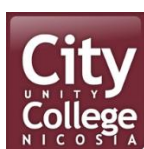
some of them are offered in cooperation with Cardiff Metropolitan University. All the programs are recognized by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education. Besides the accredited academic programs CUCN offers a variety of professional short courses in different areas. The total number of students in both academic and vocational oriented programmes is approximately 1000.

INERCIA DIGITAL SL

Country: Spain, Aljaraque.

Description: The project partner

Inercia Digital has received the accreditation of the Certificate of Compliance by AENOR with the AENOR EA0043 Young Innovative Company title, awarded to "Inercia Digital: training company" (2015). Beyond that, the Andalusian Employment Service has also awarded Inercia Digital the title of "Entidad Colaboradora de Formación para el Empleo" (Collaborative Entity in the Training for Employment) in the field of e-learning as a virtual training centre fostering employment and honing employability skills for job seekers. Inercia Digital was also appointed a new member of the "Digital Skills and Jobs Coalition" of the European Commission in 2017. In addition, our Erasmus+ Accreditation for Vocational Education and Training have been approved in 2021! Inercia Digital is also a specialist in the implementation of e-learning platforms: Learning Management Systems (LMS). Their innovation in digital skills for education has led them to create and manage various web pages and virtual platforms for educational institutions and training providers in order to help them integrate ICT into their daily activities. At the same time, Inercia Digital has trained said institutions in digital skills and web tools, e-learning and collaborative work. Inercia Digital has ample international and European experience, inside and outside the Erasmus+ Programme.

Italian Hospitality School SRL

Country: Italy, Roma   www.hoschool.it

Description: The project partner
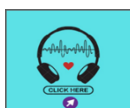
ITALIAN HOSPITALITY SCHOOL is a private Adult Education and Vocational Education (VET) institution that offers tourism and hospitality ("Hotel services", "Catering services" "Cook assistant"), EQF level 5 courses, summer university with a professional orientation for young people from all over the world, with an exciting holiday program in Rome, to discover the history, art and culture, of the city, to learn Italian language and earn ECTS points.

ITALIAN HOSPITALITY SCHOOL focuses also on general and academic language courses, to build the practical understanding and language skills of learners all the way to fluency. The school's partners are Italian hotels and resorts that offer internships and jobs for students.
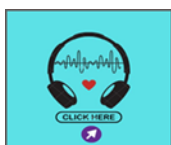
III Introduction

The project consortium consists of the six participants: SIA "HOTEL SCHOOL" Viesnīcu biznesa koledža (E10176704 - Latvia)- the project coordinator; ERHVERVSAKADEMI DANIA (E10102026 - Denmark) – the project partner; DigitalGuest APS (E10277526 - Sweden) – the project partner; INERCIA DIGITAL SL (E10145080 - Spain) – the project partner; Italian Hospitality School SRL (E10242654 - Italy) – the project partner; City Unity College Nicosia (E10155506 - Cyprus) – the project partner. The project consortium applied with the project proposal because each participant is interested in its performance for own needs, national, regional needs for such cooperation and development of useful qualitative resources and advancing these organisations during the cooperation and after. The project meets the needs of each participant: to advance own representation in the market, apply own competence, merge the competences and develop the project results of demand in all partnership countries and other EU countries.

Figure 1, Source: Tima Miroshnichenko

The guidebook offers a review of the sustainable hospitality digitalisation theoretical framework, related definitions, skills and competences structured in a The Sustainable Hospitality Digitalisation Competence Framework. The educational material explains how to learn sustainable hospitality digitally and advance digital skills, how to infuse digitalisation in hospitality working environments, how to measure sustainable hospitality digitalisation. The guidebook includes a set of collected international practices and case studies of sustainable hospitality digitalisation and Existing market offers for digitalisation of hospitality leading to sustainability.

IV The Aim and the Objectives of the Guidebook

The guidebook includes hospitality digitalisation theoretical framework, concepts, components and up-to-date international practices on digital technologies and digitalisation used for hospitality industry qualification studies, industry field workshops and working environment, international contemporary hospitality professional environment.
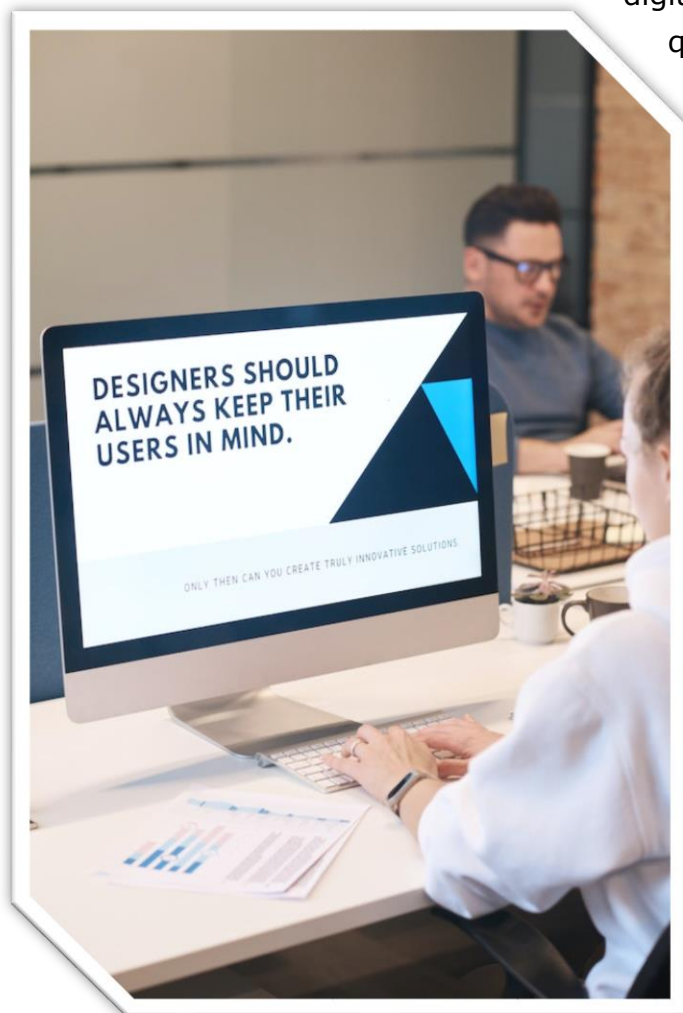
Figure 2, Source: fauxels at pexels

The Digital Guidebook includes review of such digitalisation practices as guest-facing systems, in-room IoT sensors, hospitality services, body area sensors, energy management, building automation and monitoring, augmented reality and Beacon technology. Responding to SD Goals, the Guidebook also outlines the environmentally sound hospitality digitalisation technologies.

On the basis of DigComp 2.0, 2.1, 2.2. The Conceptual Reference Model for the Digital Competence Framework for Citizens including

1) information and literacy,
2) communication and collaboration,
3) digital content creation,
4) safety,
5) problem-solving

and taking into consideration the specifics of the Hospitality Business digitalisation, the Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist is developed.
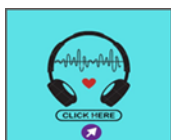
V Description of the Target Audience for the Guidebook

Sustainable Hospitality Digitalisation Guidebook for VET Learners and Professionals targeted for initial and continuous VET learners, but applicable to wider hospitality audience including Hospitality industry employees and amateurs making it applicable to all.

The digital guidebook provides review of

1) how to learn sustainable hospitality digitally and advance digital skills;
2) what is sustainable hospitality digitalisation concept and process, how to learn and update knowledge and skills on sustainable hospitality digitalisation;
3) insights on technologies used for hospitality digitalisation, current and upcoming opportunities and international practices used by hospitality educational and industry organizations;
4) Case studies of Covid-19 effects on sustainable hospitality digitalisation and good practices;
5) sustainable digitalisation.

The Guidebook provides review of the main challenges related to digitalisation including Interoperability, Data Management, Security and Privacy, Responsiveness to address the Hospitality VET Educators and Hospitality VET Learners to develop the competencies considering these challenges.

The developed materials will help learners to continuously develop their digital skills and hospitality digitalisation skills.

As OER available in open access website, the Guidebook will improve competence in sustainable hospitality digitalisation of VET Learners and hospitality professionals who will reach information via dissemination activities and open access website and to whom this information is shared in all academic and industry professional networks.
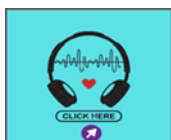
1. Review and Summary with the Links to the Related Regulative Documents

DIGITAL ACTION PLAN 2021 - 2027

1.1. What is the Digital Education Action Plan?

The Digital Education Action Plan (2021-2027) is a renewed European Union (EU) policy initiative that sets out a common vision of high-quality, inclusive and accessible digital education in Europe, and aims to support the adaptation of the education and training systems of Member States to the digital age.

The Action Plan, adopted on 30 September 2020, is a call for greater cooperation at European level on digital education to address the challenges and opportunities of the COVID-19 pandemic, and to present opportunities for the education and training community (teachers, students), policy makers, academia and researchers on national, EU and international level.

The initiative contributes to the Commission's priority 'A Europe fit for the Digital Age' and to Next Generation EU. It also supports the Recovery and Resilience Facility, which aims to create a greener, more digital and resilient European Union.

The Digital Education Action Plan is a key enabler to realising the vision of achieving a European Education Area by 2025. It contributes to achieving the goals of the European Skills Agenda, the European Social Pillar Action Plan and the '2030 Digital Compass: the European way for the Digital Decade'.

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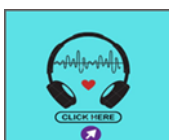
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624

DigComp 2.0, 2.1, 2.2 The Conceptual Reference Model for the Digital Competence Framework for Citizens

DigComp 2.0, 2.1, 2.2 The Conceptual Reference Model for the Digital Competence Framework for Citizens

HYPERLINK: https://www.site.digcomptest.eu/

The DigComp framework identifies the key components of digital competence in 5 areas (Dimension 1). The areas are summarised below:

Information and data literacy: To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.

Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital presence, identity and reputation.

Digital content creation: To create and edit digital content To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.

Safety: To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.

Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up-to-date with the digital evolution.

There are 21 competences that are pertinent to these areas, their titles and descriptors are outlined in Dimension 2.Taken together, Dimension 1 and 2 form the conceptual reference model. Additional Dimensions outline Proficiency levels (Dimension 3), Examples of knowledge, skills and attitudes (Dimension 4) and Use cases (Dimension 5). The latest publication, DigComp 2.2, presents the consolidated framework.

DigComp ONLINE TOOL

1.2. DigComp HYPERLINK: https://digcomp.digital-competence.eu/

An online testing tool that maps your digital competencies using the Digcomp framework

Figure 3, DigComp

Digital Competence

- Digital competence areas
  - o Information and data literacy
  - o Communication and collaboration
  - o Digital content creation
  - o Safety
  - o Problem solving
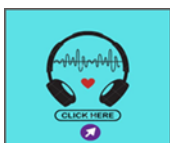
DigComp PUBLICATIONS

1.3. The DigComp Conceptual reference model:
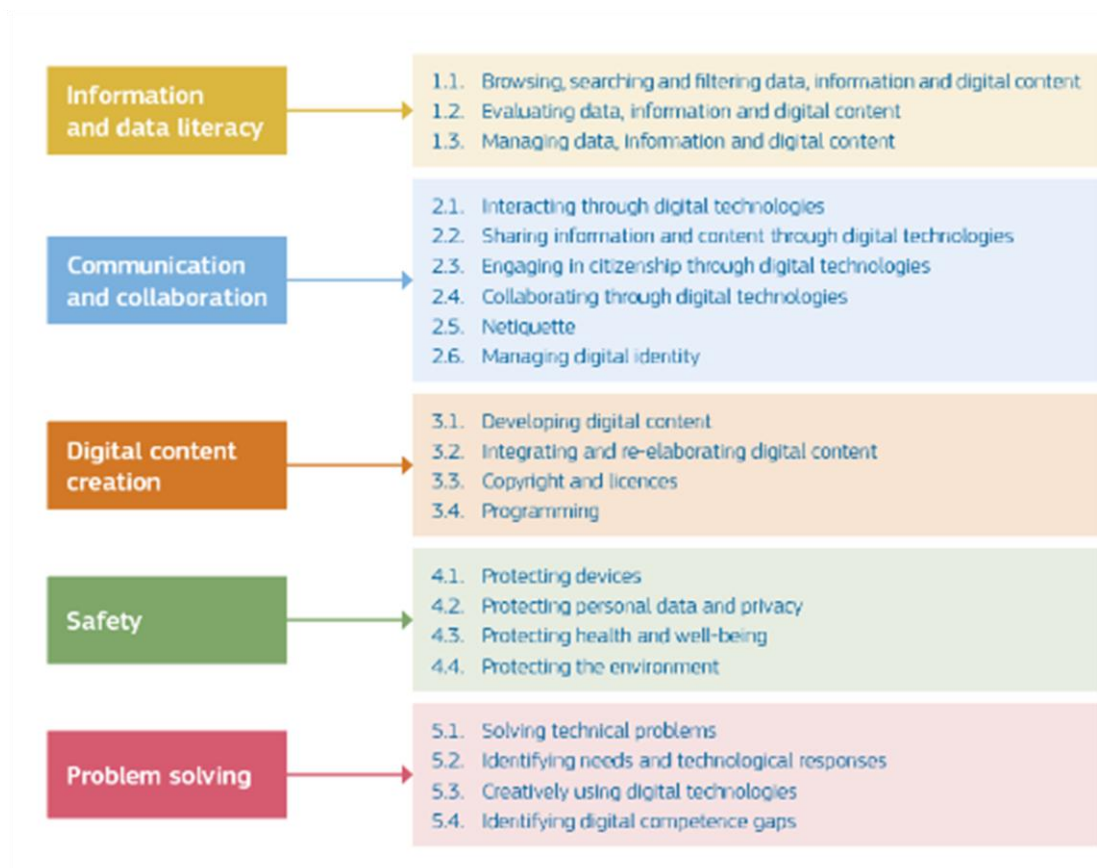
Figure 4, The DigComp Conceptual reference model

Publications

- 2022: DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes
- 2017: DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use
- 2016: DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: the Conceptual Reference Model
- 2013: DigComp: A Framework for Developing and Understanding Digital Competence in Europe
- 2012: Report on Online consultation Experts' views digital competence
- 2012: Digital Competence in Practice: An Analysis of Frameworks
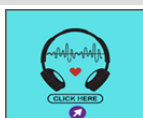
1.4. DIGITAL COMPETENCE FRAMEWORKS FOR TEACHERS, LEARNERS AND CITIZENS

Collected by UNESCO (2022):

Table 2: DIGITAL COMPETENCE FRAMEWORKS FOR TEACHERS, LEARNERS AND CITIZENS

Framework Title	Origin	Publisher year
DigComp 2.2	European Union	Publications Office of the European Union, 2022
DigCompEdu	European Union	Publications Office of the European Union, 2017
SELFIE for Teachers	European Union	European Commission, 2021
Digital Literacy Global Framework (DLGF)	Global	UNESCO Institute of Statistics, 2018
The Global Framework for Educational Competence in the Digital Age	Profutoro	Profuturo, 2020
Common Digital Competence Framework for Teachers (CDCFT)	Spain	National Institute of Educational Technologies and Teacher Training (Spain), 2017
Professional Development Framework for Digital Learning	South Africa	Department of Basic Education, South Africa, 2019
Professional Digital Competence Framework for Teachers	Norway	Norwegian Centre for ICT in education, 2017
Skills Framework for International Age (SFIA - 8)	SFIA	SFIA Foundation, 2000
Digital Competence Framework	Wales, United Kingdom	Education Wales (Welsh government, United Kingdom), 2022
International Computer Driving License (ICDL)	ICDL	ICDL Global, 2000
Digital Literacy Skills Framework (DLSF)	Australia	Australian Department for Education, Skills and Employment, 2021
Skilling the Australian Workforce for the Digital Economy - The Australian Workforce Digital Skills Framework	Australia	NCVER, 2019
Digital Teaching Professional Framework	England, United Kingdom	Education and Training Foundation,

Table 2: DIGITAL COMPETENCE FRAMEWORKS FOR TEACHERS, LEARNERS AND CITIZENS		
Framework Title	Origin	Publisher year
		England, United Kingdom
Defining the skills citizens will need in the future world of work	McKinsey	McKinsey & Company, Global, 2019
The International Society for Technology in Education (ISTE) Standards for students	ISTE	ISTE, Global, 2018
Quebec Digital Competency Framework	Quebec, Canada	Ministy of Education and Higher Education, Quebec, Canada, 2019
Common Framework of Reference for Intercultural Digital Literacies (CFRIDiL)	European Union	EUMade4LL, Erasmus+ (funded by the European Commission), 2019
Indonesian National Digital Literacy Framework	Indonesia	Bahasa, Indonesia, 2021
UNESCO ICT Competency Framework for Teachers (ICT CFT) Version 3	UNESCO	UNESCO, 2018
DQ (Digital Intelligence) Global Standard on Digital Literacy, Digital Skills and Digital Readiness	DQ Institute	DQ Institute, Global, 2019
Digischool: the Digital Literacy Programme	Kenya	UNESCO, 2018
British Columbia's Digital Literacy Framework	British Columbia, Canada	Province of British Columbia, 2013
USE, UNDERSTAND & ENGAGE: A Digital Media Literacy Framework for Canadian Schools	Canada	Mediasmarts, 2022
IC3 Digital Literacy	North America	Certiport, 2022
Microsoft Digital Literacy Curriculum	Microsofttt	Microsoft, 2022
National Digital Literacy Mission (NDLM) Scheme	India	Government of India, 2015
SkillsFuture - Skills Framework for Infocomm Technology	Singapore	Government of Singapore, 2022
ETF READY Model	European Training Foundation	European Training Foundation, 2022
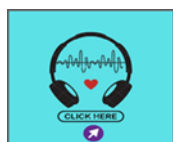
1.5. UN Framework Convention on Climate Change

United Nations. (1992). UN Framework Convention on Climate Change – UNFCCC, 1992. Retrieved from https://unfccc.int/resource/docs/convkp/conveng.pdf

The UN Framework Convention on Climate Change (UNFCCC) sets out the basic legal framework and principles for international climate change cooperation with the aim of stabilizing atmospheric concentrations of greenhouse gases (GHGs) to avoid "dangerous anthropogenic interference with the climate system." (United Nations, 1992).

1.6. Sustainable Development Goals

United Nations. (2015). Sustainable Development Goals, Retrieved from https://sdgs.un.org/goals

In June 1992, at the Earth Summit in Rio de Janeiro, Brazil, more than 178 countries adopted Agenda 21, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.

In January 2015, the General Assembly began the negotiation process on the post-2015 development agenda. The process culminated in the subsequent adoption of the 2030 Agenda for Sustainable Development, with 17 SDGs at its core, at the UN Sustainable Development Summit in September 2015. 2015 was a landmark year for multilateralism and international policy shaping, with the adoption of several major agreements:

Sendai Framework for Disaster Risk Reduction (March 2015)

Addis Ababa Action Agenda on Financing for Development (July 2015)

Transforming our world: the 2030 Agenda for Sustainable Development with its 17 SDGs was adopted at the UN Sustainable Development Summit in New York in September 2015.

1.7. Paris Agreement on Climate Change (December 2015). Retrieved from https://climate.ec.europa.eu/eu-action/international-action-climate-change/climate-negotiations/paris-agreement_en

1.8. The Katowice package adopted at the UN climate conference (COP24) in December 2018 contains common and detailed rules, procedures and guidelines that operationalise the Paris Agreement. The Katowice package adopted at the UN climate conference (COP24) in December 2018 contains common and detailed rules, procedures and guidelines that operationalise the Paris Agreement. Retrieved from https://unfccc.int/process-and-meetings/the-paris-agreement/the-katowice-climate-package/katowice-climate-package

Some of the related SDGs: SDG 7 Affordable and Clean Energy, SDG 13 Climate Action, SDG 12 Responsible Consumption and Production
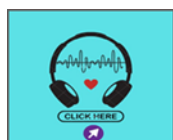
1.9. The European Green Deal

Striving to be the first climate-neutral continent. Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

To overcome these challenges, the European Green Deal will transform the EU into a modern, resource-efficient and competitive economy, ensuring:

• no net emissions of greenhouse gases by 2050

• economic growth decoupled from resource use

• no person and no place left behind

The European Green Deal is also our lifeline out of the COVID-19 pandemic. One third of the €1.8 trillion investments from the NextGenerationEU Recovery Plan, and the EU's seven-year budget will finance the European Green Deal.

The first climate-neutral continent by 2050

At least 55% less net greenhouse gas emissions by 2030, compared to 1990 levels

3 billion additional trees to be planted in the EU by 2030.

1.10. European Climate Law

European Climate Law. (2021). Retrieved from https://climate.ec.europa.eu/eu-action/european-green-deal/european-climate-law_en

The European Climate Law was published in the Official Journal on 9 July 2021 and entered into force on 29 July 2021.

The European Climate Law sets a legally binding target of net zero greenhouse gas emissions by 2050. The EU Institutions and the Member States are bound to take the necessary measures at EU and national level to meet the target, taking into account the importance of promoting fairness and solidarity among Member States.

The Climate Law includes measures to keep track of progress and adjust our actions accordingly, based on existing systems such as the governance process for Member States' national energy and climate plans., regular reports by the European Environment Agency, and the latest scientific evidence on climate change and its impacts.

Progress will be reviewed every five years, in line with the global stocktake exercise under the Paris Agreement.

The Climate Law also addresses the necessary steps to get to the 2050 target:

• Based on a comprehensive impact assessment, the EU has set a new target for 2030 of reducing net greenhouse gas emissions by at least 55% compared to levels in 1990. The new EU 2030 target is included in the Law.

• The Law also includes a process for setting a 2040 climate target.
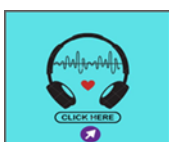
The Climate Law includes:

•   a legal objective for the Union to reach climate neutrality by 2050

•   an ambitious 2030 climate target of at least 55% reduction of net emissions of greenhouse gases as compared to 1990, with clarity on the contribution of emission reductions and removals

•   recognition of the need to enhance the EU's carbon sink through a more ambitious LULUCF regulation, for which the Commission made a proposal in July 2021

•   a process for setting a 2040 climate target, taking into account an indicative greenhouse gas budget for 2030-2050 to be published by the Commission

•   a commitment to negative emissions after 2050

•   the establishment of European Scientific Advisory Board on Climate Change, that will provide independent scientific advice

•   stronger provisions on adaptation to climate change

•   strong coherence across Union policies with the climate neutrality objective

•   a commitment to engage with sectors to prepare sector-specific roadmaps charting the path to climate neutrality in different areas of the economy

REGULATION (EU) 2021/1119 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law')

Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

1.11. Governance of the Energy Union and Climate Action

Retrieved   from: https://climate.ec.europa.eu/eu-action/climate-strategies-targets/progress-made-cutting-emissions/governance-energy-union-and-climate-action_en

To help the EU reach its 2030 climate and energy targets, the Regulation on the Governance of the Energy Union sets common rules for planning, reporting and monitoring. The Regulation also ensures that EU planning and reporting are synchronised with the ambition cycles under the Paris Agreement.

Regulation retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ:L:2018:328:TOC&uri=uriserv:OJ.L_.2018.328.01.0001.01.ENG
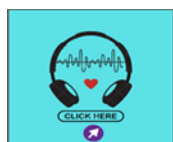
1.12. REGULATION (EU) 2018/1999 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council

The national energy and climate plans (NECPs) were introduced by the Regulation on the governance of the energy union and climate action (EU)2018/1999, agreed as part of the Clean energy for all Europeans package which was adopted in 2019.

1.13. The National Plans

- The national plans outline how the EU countries intend to address
- energy efficiency
- renewables
- greenhouse gas emissions reductions
- interconnections
- research and innovation

This approach requires a coordination of purpose across all government departments and it provides a level of planning that will ease public and private investment.

The National Plans are retrieved from https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

Latvia NECP (2020). Retrieved from https://energy.ec.europa.eu/system/files/2020-04/lv_final_necp_main_en_0.pdf

1.14. Latvia on Paris Agreement:

Par Apvienoto Nāciju Organizācijas Vispārējās konvencijas par klimata pārmaiņām Parīzes nolīgumu. Retrieved from https://likumi.lv/ta/id/288575-par-apvienoto-naciju-organizacijas-visparejas-konvencijas-par-klimata-parmainam-parizes-noligumu

  (Ritchie, H., Roser, M. (2023). Latvia: CO2 Country Profile. Our World Data Retrieved from https://ourworldindata.org/co2/country/latvia)

1.15. Data protection in the EU

1.15.1. The General Data Protection Regulation (GDPR), the Data Protection Law Enforcement Directive and other rules concerning the protection of personal data.

Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504&qid=1532348683434
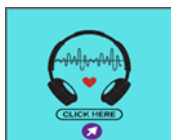
1.15.2. What is Personal Data?

Personal data is any information that relates to an identified or identifiable living individual. Different pieces of information, which collected together can lead to the identification of a particular person, also constitute personal data.

Personal data that has been de-identified, encrypted or pseudonymised but can be used to re-identify a person remains personal data and falls within the scope of the GDPR.

Personal data that has been rendered anonymous in such a way that the individual is not or no longer identifiable is no longer considered personal data. For data to be truly anonymised, the anonymisation must be irreversible.

The GDPR protects personal data regardless of the technology used for processing that data – it's technology neutral and applies to both automated and manual processing, provided the data is organised in accordance with pre-defined criteria (for example alphabetical order). It also doesn't matter how the data is stored – in an IT system, through video surveillance, or on paper; in all cases, personal data is subject to the protection requirements set out in the GDPR.

Examples of personal data

- a name and surname;
- a home address;
- an email address such as name.surname@company.com;
- an identification card number;
- location data (for example the location data function on a mobile phone)*;
- an Internet Protocol (IP) address;
- a cookie ID*;
- the advertising identifier of your phone;
- data held by a hospital or doctor, which could be a symbol that uniquely identifies a person.

*Note that in some cases, there is a specific sectoral legislation regulating for instance the use of location data or the use of cookies – the ePrivacy Directive (Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002(OJ L 201, 31.7.2002, p. 37) and Regulation (EC) No 2006/2004) of the European Parliament and of the Council of 27 October 2004 (OJ L 364, 9.12.2004, p. 1)
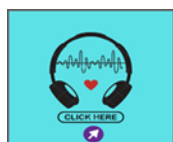
Examples of data not considered personal data

- a company registration number;
- an email address such as info@company.com;
- anonymised data.

Figure 5, Source: Monicore at pexels.com

References:

Article 2, Article 4(1)and (5) and Recitals (14), (15), (26), (27), (29) and (30) of the GDPR

Article 29 Working Party Opinion 4/2007 on the concept of personal data

Article 29 Working Party Opinion 05/2014 on Anonymisation Techniques
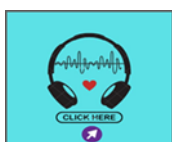
2. Sustainable Hospitality Digitalisation Theoretical Framework

The theoretical framework of sustainable digitalization in the hospitality industry aims to provide theoretical insights into the components and tools of digitalization that would equip you with the necessary understanding of the concept.

The definition of digital transformation by Solis (2016) is: "the investment in and development of new technologies, mindsets, and business and operational models to improve work and competitiveness and deliver new and relevant value for customer and employees in an ever-evolving digital economy". The definition outlines the importance of innovativeness, strategic human resource management, and technology integration. Within the hospitality industry, digital transformation requires action in four main aspects:

Digital Transformation:
1) **Framing digital challenge,**
2) **Focus investment,**
3) **Engaging the organization,**
4) **Sustaining transformation (Prihanto & Kurniasari, 2019).**

According to Bumann & Peter (2019), the digital transformation framework consists of six components, namely:

- **THE DIGITAL TRANSFORMATION FRAMEWORK:**
- STRATEGY
- ORGANIZATION
- PEOPLE
- CUSTOMER
- TECHNOLOGY
- CULTURE (Bumann & Peter, 2019)

• **Strategy -** successful digitalization starts with building sophisticated digital long term and short term development strategy. The digitalization aspect of hospitality enterprises should be implemented in corporate, as well as business and functional level strategies. Well formulated digitalization strategy is the cornerstone of digitalization success.

• **Organization** - the most important factor in implementing the digital strategy is organizations' set up, partnership networks, collaborative spirits. If
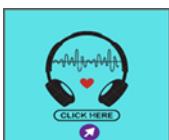
organization is flexible, collaborative, it can quickly respond to changes in the environment and implement digitalization tools at much faster rate.

• **People** - the employees, their knowledge, skills, competencies and determination is critical factor for digitalization implementation. The employees should be willing and capable of learning, improving, and committed to personal and professional development.
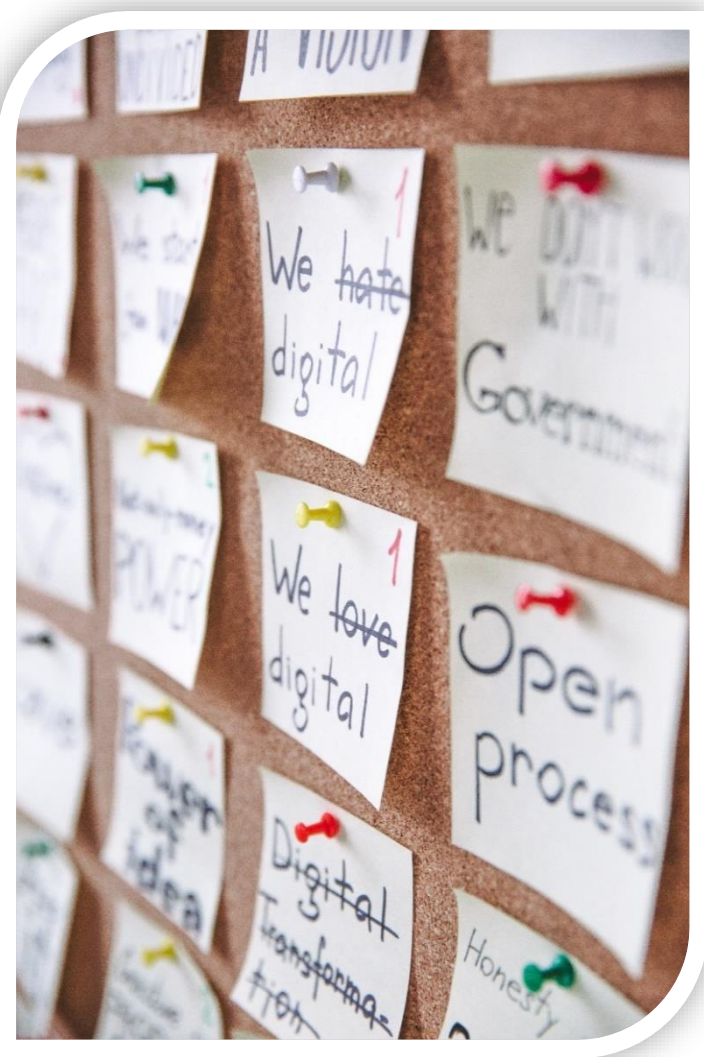
Figure 6, Source: Polina Zimmerman at pexels

• **Customer** - customers have become more aware of digitalization tools and request more hybrid interaction channels. Customers want to interact with the organization via traditional and digital means, and while doing so, customers provide organizations with the data and customer insights.

• **Technology** - one of the aspects of hospitality industry digitalization is the organizations capabilities, ability and strategy to acquire, use and adopt new technologies. The flexibility, speed and innovation is crucial aspects.

• **Culture** - the hospitality organizations' culture also plays important role in digitalization process. The digitalization process requires strong digital leaders, commitment from the higher levels of management and freedom given to employees to experiment.

In conclusion, the sustainable hospitality digitalization framework is composed of multidimensional and complex structures, and digitalization should be the priority in strategic, business, and functional levels of organizational management.

3. Definitions: Theory review

In this chapter we will be looking into the definitions regarding sustainability per se, SDG, digitalisation, and the application and implication of all of them into the hospitality industry.

The aim is to give you – the reader – an insight into the terminology definitions of sustainability, hospitality, and digitalisation from a theoretic perspective.

3.1. Sustainability

While we maybe as consumers today on a daily notion naturally adheres to various social etiquettes and behave and act sustainably in terms of preserving and saving the natural resources, we otherwise require and demand for our modern lifestyle, the terminology of sustainability in fact is of a relatively resent origin.

To help understand the definition of sustainability, one can therefore apply the usage of an expert on linguistic understanding.

Thus, if you applies the usage of Oxford Languages in determining an overall definition, they say; "Avoidance of depletion of natural resources in order to maintain an ecologic balance" (https://languages.oup.com/google-dictionary-en/)

Though, to understand the terminology in a more broader and practical applied fashion by today standards, one can turn to the most commonly applied definition for sustainability as how UN back in 1987 defined via its Brundtland Commission report "Our common future" as "meeting the need of the present without compromising the ability of future generations to meet their own needs" (http://www.un-documents.net/our-common-future.pdf)

Today, there are almost 140 developing countries countries in the world seeking ways of meeting their development needs, but with the increasing threat of climate change, concrete efforts must be made to ensure development today does not negatively affect future generations. (https://www.un.org/en/academic-impact/sustainability)

Thus, the most noticeable difference between the former and the latter definition is that while the former can be applied universally, the latter however, is backed up by an encore of actions on how to achieve the abovementioned latter credo.

Thusly, UN's definition on sustainability is sustained by its actions via its SDG scheme, Sustainable Development Goals.
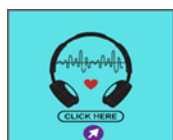
3.2. Sustainable Development Goals

The concept of sustainable development has become a widely recognized goal for human society in the 21st century. The idea of sustainable development came to light in 1987 with the publication of "Our Common Future," which firmly established sustainable development as a critical component of international development. Because inequalities that had been anomalies were increasing within and among nations, increasing poverty, especially in developing countries, depleting the ozone layer and causing global warming, depleting natural resources and endangering some species of animals and plants, and causing water and air pollution, and so forth, sustainable development came about as an effort to change the way of thinking about the planet. (Haijan & Kashani, 2021)

What are the Sustainable Development Goals

In an agreement the member nations of the UN in 2015 adopted a series of standards and objectives "as a universal call to action to end poverty, protect the planet, and to ensure that by 2030 all people enjoy peace and prosperity". (United Nations, 2015) LINK: (https://www.undp.org/sustainable-development-goals)
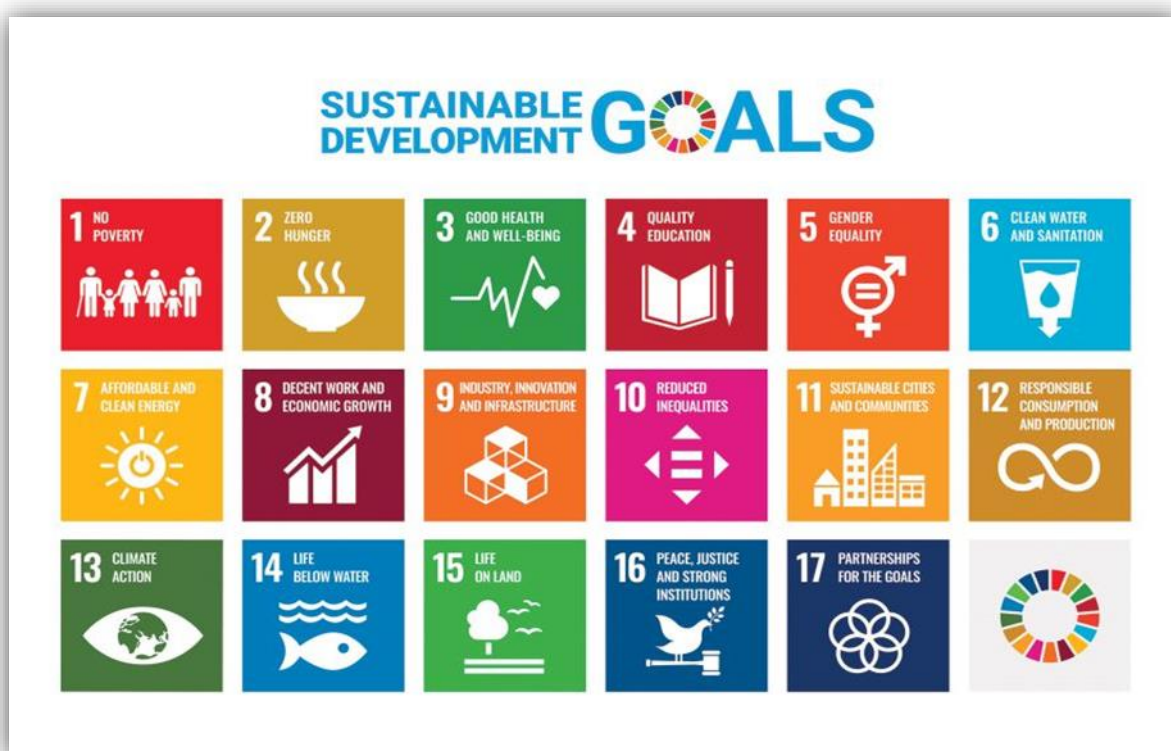
Figure 7, Source: United Nations.
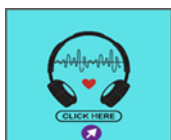
3.2.1. The Objective of SDGs

This path towards sustainable development is known as the 2030 Agenda for Sustainable Development Goals. This agenda includes 17 Sustainable Development Goals, or SDGs, which set out quantitative objectives across the social, economic, and environmental dimensions of sustainable development – all to be achieved by 2030. The goals provide a framework for shared action "for people, planet and prosperity," to be implemented by "all countries and all stakeholders, acting in collaborative partnership." 169 targets accompany the 17 goals and set out quantitative and qualitative objectives to be achieved by 2030. These targets are "global in nature and universally applicable, taking into account different national realities, capacities and levels of development and respecting national policies and priorities." (United Nations, 2015).

The SDGs update the Millennium Development Goals (MDGs), which commenced a worldwide attempt in 2000 to challenge the indignity of poverty. The MDGs created measurable, universally agreed-upon targets for tackling excessive poverty and starvation, preventing lethal sicknesses, and expanding primary schooling to all young people, among other development priorities. (Haijan & Kashani, 2021, p.1-21)

Figure 8, Source: SDGs. https://sdg.gdrc.org

The SDGs has benefitted the both the public knowledge on sustainability as a concept and laying the building ground for further augmentation of the empiric understanding of them as seen in the next model.
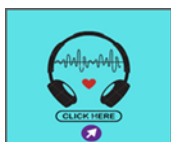
4. Hospitality

Hospitality as a trade and terminology can finds its trace and origin back to the dawn of ancient civilisation and to ever since mankind found the ability of crafting wine out of grapes to be served in tavernas or inns as a commercial opportunity.

The etymological roots of the term hospitality can be identified as being Medieval Latin "hospes" (guests); "hospitari" (be a guest); and "hospitabilis" (put up as a guest) (American Heritage Dictionary, 2007)

The definition of the commercial modern era styled hospitality can be seen through the scope of societal development (Hepple, Kipps and Thomsom, 1990) by identifying four characteristics in its modern sense:

1)   It is conferred by a host on a guest, who is away from home.

2)   It is interactive, involving the coming together of a provider and a receiver.

3)   It is comprised of a blend of tangible and intangible factors.

4)   The host provides for the guest' security, psychological and physiological comfort.

Figure 9, Source: Leeloo Thefirst at pexels

This indicates or highlight that hospitality imply a reciprocal relationship with certain imposed obligations on the guest, however equally vice versa.

From a historical perspective two types of hospitality can thusly be identified (Carol A. King – 1995 – Viewpoint – What is hospitality – Elsevier Science Vol. 14)

1)   Private hospitality: acts by individuals towards individuals in a private setting, such as the home.

2)   Commercial hospitality: meals, beverages, lodging, and entertainment provided for a profit.

The separation of these two definitions can in our modern world seem somewhat blurred given the appearance of digital options e.g., Airbnb and other similar
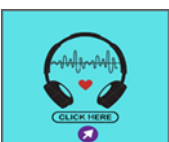
digital platforms. Through such "sharing economy" platforms individuals can via the individual countries incorporated short terms legislations commercially rent out part of/or all parts of their house against a profit.

By providing their digital services via its platform, Airbnb is offering a shift of paradigm away from the classic perception of the two abovementioned hospitality definitions by acting as intermediary rather than as an actual host or provider. Equally, this platform might have moved away from its original concept of private hosting to a private person in a single entity towards a more commercialisation approach in which the receiver/guest will experience no human contact nor

Figure 10, Source: PhotoMIX Company at pexel

hosting facilitation other than a digital guidance to how to entering the rented entity given that more and more entities being offered on Airbnb are only being done so via professional landlords with multiple entities and in doing so are pushing the boundaries for long-term housing seekers in various larger urban areas on a global scale into jeopardy.

On the very same notion, the hospitality industry is also being contended with the ongoing tete-a-tete with the might of the OTA's as they as seen in the case of Airbnb merely acts as digital intermediaries rather than hosts. No matter, both platform providers can be considered acting harmfully onto the real hospitality providers disruptively.

Figure 11, Source: Proxyclick Visitor Management System at pexels
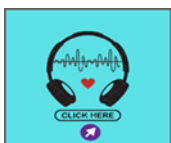
5. Sustainable Hospitality

While hospitality comprises, an all-encompassing terminology applied all operating business parts within the industry, framing an actual definition on sustainable hospitality, though since research on sustainable hospitality still is in its infancy, the understanding is made more compliant by applying the widening term "tourism" as reference and focal point instead.

SUSTAINABLE TOURISM

5.1. Sustainable tourism refers to sustainable practices in and by the tourism industry. It is an inspiration to acknowledge all impacts of tourism. Both positive and negative. It aims to minimize the negative impact and maximize the positive ones.

Negative impacts to a destination include economic leakage, damage to the natural environment and overcrowding to name a few.

Figure 12, Source: Amina Filkins at pexels

Positive impacts to a destination include job creation, cultural heritage preservation and interpretation, wildlife preservation, landscape restoration and more.

Sustainable tourism is defined by the UN Environment Program and UN World Tourism Organisation as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities."

Additionally, they say that sustainable tourism "refers to environmental, economic, and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee it long-term sustainability" (UNEP & UNWTO, 2005).

5.2. THE GLOBAL SUSTAINABLE TOURISM COUNCIL (GSTC)

Conjointly, **The Global Sustainable Tourism Council (GSTC**) have devised a serial of industrial Criteria and indicators in an effort to create a common understanding of sustainable tourism that when applying them into a hospitality corporation should lead to among others the following:

• Serve as the basis for certification for sustainability

• Serve as basic guidelines for businesses of all sizes to become more sustainable, and help businesses choose sustainable tourism programs that fulfill these global criteria

Figure 13, Source: Quang Nguyen Vinh at pexels

• Provide greater market access in the growing market for sustainable products, serving as guidance both for travelers and for travel agencies in choosing suppliers and sustainable tourism programs

• Help consumers identify sound sustainable tourism programs and businesses

• Serve as a common denominator for information media to recognize sustainable tourism providers

• Help certification and other voluntary programs ensure that their standards meet a broadly accepted baseline

• Offer governmental, non-governmental, and private sector programs a starting point for developing sustainable tourism requirements

• Serve as basic guidelines for education and training bodies, such as hotel schools and universities

• Demonstrate leadership that inspires others to act (Global Sustainable Tourism Council (GSTC), 2023).

6. Digitalisation

The literature that measures the digital transformation is wide and, given the complexity and pervasiveness of the phenomenon, it is not easy to adopt an unequivocal definition of digitalisation. (Calvino, F., Criscuolo, C., 2019)

The most simplistic form of definition of digitalisation can be found by via Oxford Learners Dictionary that put forward this general definition "the process of changing data into digital form that can be easily read and processed by a computer". (Oxford University Press, 2023).

DIGITALIZATION (DIGITALISATION)–
THE PROCESS OF CHANGING DATA INTO DIGITAL FORM THAT CAN BE EASILY READ AND PROCESSED BY A COMPUTER

(Oxford University Press, 2023)

Though since this definition only rudimental addresses the complexity of the transformative process, one must apply a more business approach in order to understand it in depth.

"Digitalisation is the incorporation of digital technologies into business/social processes, with the objective of improving them. Digitalisation is transformative. It changes how corporations interact with their customers and often their revenue stream". (Scrive.com, 2023).

DIGITIZATION OR DIGITALIZATION ?

DIGITIZATION: For starters, digitization is creating a digital (bits and bytes) version of analog/physical things such as paper documents, microfilm images, photographs, sounds and more. So, it's simply converting and/or representing something non-digital (other examples include signals, health records, location data, identity cards, etc.) into a digital format which then can be used by a computing system for numerous possible reasons.
Digitization is the automation of existing manual and paper-based processes, enabled by the digitization of information; from an analog to a digital format.

(I-scoop.eu, 2023)

In business, digitalisation therefore most often refers to the enabling, improving, or transforming of either business operations, functions, processes, or models by leveraging digital technologies and a broader usage and context of digitised data,
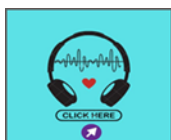
turned into intelligence and actionable knowledge, with a specific benefit in mind. (I-scoop.eu, 2023).

Thus, via the means of IOT and Big Data, one can devise systems of engagement and systems of insight, leveraging digitised data and processes without being hampered or cluttered by paperwork clogging.

DIGITALISATION

In short, "digitalisation is the generic term for digital transformation of society and the economy. It describes the transition from an industrial age characterised by analogue technologies to an age of knowledge and creativity characterised by digital technologies and digital business innovation

(Innolytics, 2023)

Hence digitalisation equally has the meaning of going beyond the realm of business by referring to the ongoing adaptation of digital technologies across all possible societal and human activities.

Digitalisation therefore ultimately means the usage of digital technologies and of data (digitised and natively digital) in order to create revenue, improve business, replace/transform business processes (not simply digitise them) and in doing so creating an environment for digital business, whereby digital information is at its core.

Figure 14, Source: Polina Zimmerman at pixels.com
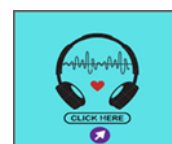
7. Sustainable Digitalisation
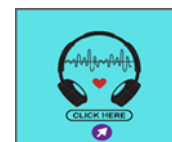
SUSTAINABLE DIGITALISATION

"Sustainable digitalisation, which incidental equal is known as sustainable digital transformation, as **a concept refers to the process of digitalising the economy in a long-lasting, green, and organic way. Sustainable digitalisation aims to support and enable...twin transition to a green a digital economy by building on its key strength: Innovative SMEs and their business ecosystems".** (European DIGITAL SME Alliance, 2023).

Sustainable digitalisation is a process whereby societies digitise themselves in a way that safeguards natural resources, respects the environment and people. It is about the transformation of organisations, people and societies that must take place in such a way that they have not yet made the shift to digital. (European Digital SME Alliance, 2023).

Today, digital transformation must offer solutions under the umbrella of sustainability, i.e., it must ensure a balance between what it means to take that step towards connectivity and economic growth, with care for the environment and social welfare, protecting the natural resources of the future. This is the only way to talk about sustainable digitalisation. (Telefonica, 2023).

The concept of digital sustainability is defined as encompassing the wide range of issues and concerns that contribute to the longevity of digital information. Digital sustainability, it is demonstrated, provides the context for digital preservation by considering the overall life cycle, technical, and socio-technical issues associated with the creation and management of the digital item. (Bradley, K., 2007, 56, 148–163.)

The introduction and usage of sustainable digitalisation is all part of the digital era, which equally is referred to as the "Forth Industrial Revolution (4IR)" and in which the notion is all on the development of new technologies. If you look apart from the individual effects, emphasis is on economic factors e.g., innovation gains, generation of new sales and value growth opportunities while equally addressing higher productivity output and increased efficiency in processes. In this sense, efficiency improvements are crucial for reducing resource consumption. (Fuchs, H. 2019).

8. Sustainable Hospitality Digitalisation Toolkit

The reasoning and aim of any given project of this sort, is to enhance access to digital training and qualifications for all students within the field of hospitality management studies, supported by pooling of resources, providing initial and/or continuing training to the lectures and educators inside the line of hospitality management educations, and strengthening further the key competences in initial and continuing VET, in particular digital skills, green skills, and employability.

The project should incorporate the following objectives:

•	Develop the Sustainable Hospitality Digitalisation Guidebook for initial and continuous VET Learners.

•	Provide practical guidelines "Pedagogy of Sustainable Hospitality Digitalisation" to VET Educators and coaches of initial and continuous professional hospitality education.

•	Produce a digital course "Sustainable Hospitality Digitalisation Toolkit" with teaching and learning resources for initial and continuous VET education and professional field workshops.

•	Produce series of webinars to demonstrate how to use the resources and the course by the educators and learners from the two perspectives and produce reviews on related sustainable digitalisation subtopics.

•	Improve VET educators' knowledge about hospitality digitalisation and approaches to embed digitalisation in the units.

•	Mobilise social capital to raise awareness and promote the need to improve digital and digitalisation skills in Hospitality VET education and in the hospitality industry.

•	Improve the intellectual and digitalisation competence of the project participants. (Sustainable Hospitality Digitalisation Toolkit, Hotel School, 2023).
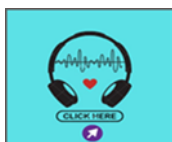
9. Sustainable Hospitality Concept and Sustainable Hospitality Process

When defining sustainable hospitality concept and processes, one must first and foremost dwell on the contents of what a hospitality concept and processes comprises of. they can be defined as being bringing together the strategic and creative outline on how to realise an operating hospitality venture. It should piece together the various soft and hard detailed elements, to give strategic guidance, and to outline the how and why of any given hospitality concept to all relevant stakeholders, based on a clearly defined brand value and characteristics.

Equally, one must define and emphasise the understanding difference between sustainability and financial sustainability, as they conceptually are not necessarily intertwined with each other. However, the perception of sustainable hotel concept combines the two by implementing them into the realm of the triple bottom line as described by John Elkington:

Figure 15, Elkington, J. Tripple Bottom Line 1

The TBL comprises of these three dimensions the combined forms the structure of understanding the definition of sustainable hospitality concept:

• The environmental dimension (planet) consists of the regulation of execution of processes and products to improve one's environmental impact – the business carbon footprint.

• The social dimension (people) is about the way in which social equity and corporate governance are defined and followed within the entity business and about the inclusion of the wider community and local culture.

• The economic dimension (profit) regards the way in which the entity business organises its position in the marketplace to actively develop its sustainable profile by using its economic stability and profitability for continuous improvement.
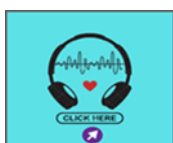
The reasoning for applying sustainable hospitality concept can be measured by the achievement you will align this.

• You will be using your resources more effectively

• You will device a business culture that will enhance the morale, motivation, and satisfaction of your employees.

• You will through sustainable initiatives opening a dialogue with the wider inner and outer community.

• You will through sustainable business practices improve your branding image and enhancing your revenue potential on the long run.
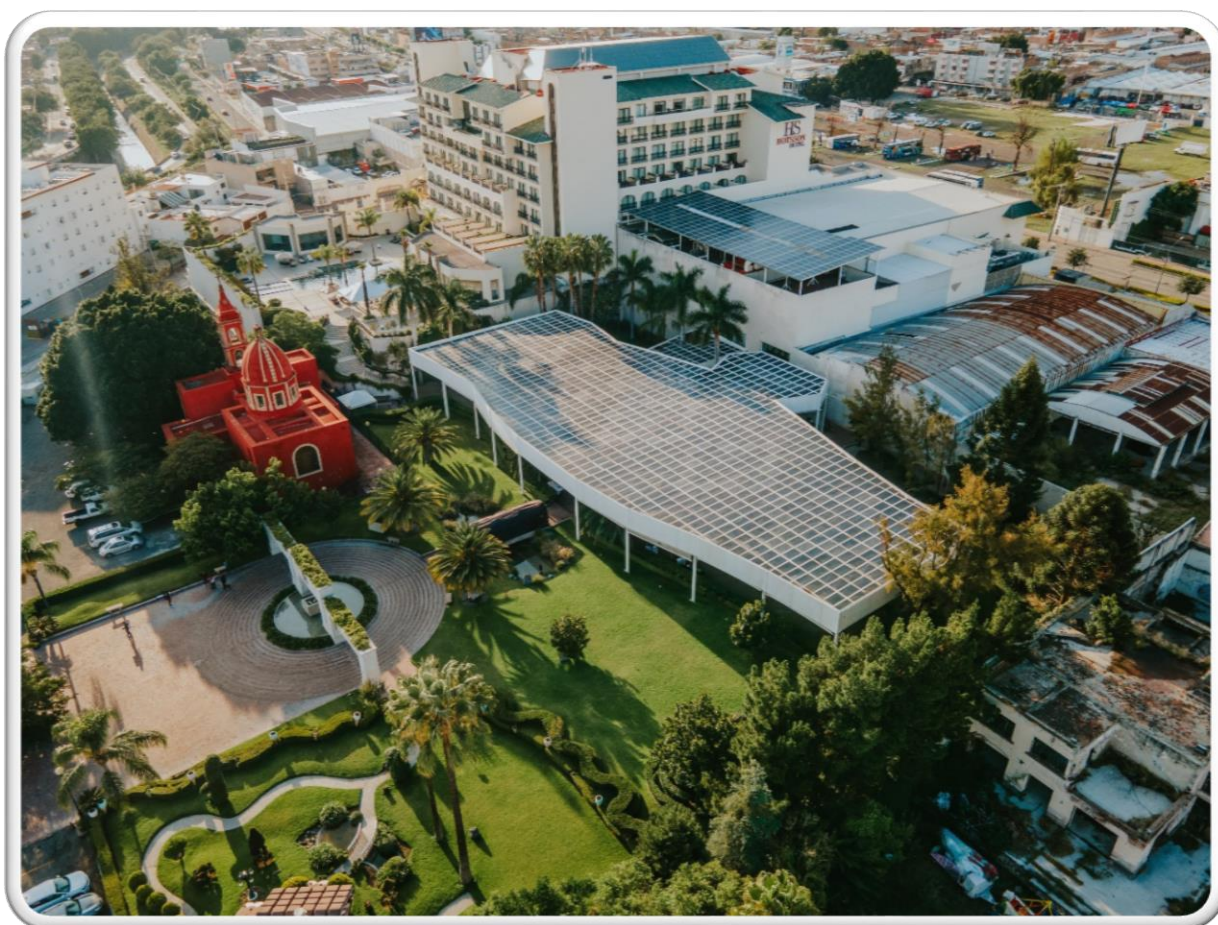
Figure 16, Source: Amar Preciado at pexels.com
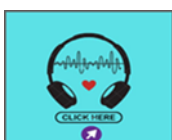
10. Digital Skills

Before getting started it is important to find out what is understood by digital, digitalization and green skills and we need to find out what it means to have a certain skill.

The understanding of what define skills and the two categories can be useful as a frame for identifying if the employees in a specific context in a specific company possess the needed skills to carry out the required tasks or upgrading is needed.

Considering several definitions, we can define skills as "the power acquired to perform a task properly using time, energy, and knowledge. (Skilltype.com, 2023).

Skills can be grouped in two categories: general skills cover the ability to take part in the daily work at a workplace (meetings, self-management, teamwork etc.) and special skills cover knowledge-based functional skills as certain tasks including educational knowledge and training.

Figure 17, Source: Mikael Blomkvist at pexels.com

It is important to be aware of the European focus on educating people. Policies, educational programs, and funding is essential in this work and students, employees and companies can benefit from this in their process of taking the right decisions on improving the workforce and the company's ability to move in a sustainable direction.

An overall policy/pillar in the European Union is the Pillar of Social Rights.

Skills for jobs in a green and digital economy no matter what industry or country you live in. Below you will an overview of all the actions taken by EU. Of course, they can be transferred to countries outside the EU as a framework.

The green and digital transitions as accompanied by demographic trends are transforming how we live, work and interact. We want to ensure people have the skills they need to thrive. The Skills Agenda aims to improve the relevance of skills in the EU to strengthen sustainable competitiveness, ensure social fairness and build our resilience. It does this through 12 "actions".

10.1. A PACT FOR SKILLS
(European Commission, 2020)

A Pact for Skills

- Strengthening skills intelligence

- EU support for strategic national upskilling action

- Proposal for a Council Recommendation on Vocational Education and Training for sustainable competiveness, social fairness and resilience

- Rolling out the European university's initiative and upskilling scientists

- Skills to support the green and digital transitions

- Increasing STEM graduates and fostering entrepreneurial and transversal skills

- Skills for Life

- Initiative on Individual Learning Accounts

- A European approach to micro-credentials

- New Europass Platform

- Improving the enabling framework to unlock Member States' and private investments in skills (European Commission, 2020).
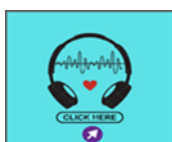
11. Digitalisation skills

The next question appearing is the question: How to find out about the needed skills in different job positions in the hospitality industry? This question will be reviewed in the section "Digitalisation competences digitalisation competences required in for hospitality qualifications (including culinary arts)". First, we need to find out what type of skills is covered by digital, digitalization and green. Digital skills and digitalization skills are difficult to define in since a lot of different understandings appear when trying to find a common understanding. A hint can be found in the Jason Bloombergs article:

In fact, it appears that Gartner is not of one mind on its definition of digitalization, as a recent Brookings Institute report quotes an entirely different one. "Digitalization, according to Gartner, Inc., is the process of employing digital technologies and information to transform business operations," according to the report Digitalization and the American Workforce by Mark Muro, senior fellow; Sifan Liu, data analyst; Jacob Whiton, research assistant; and Siddharth Kulkarni, former research analyst; all from the Brookings Institution. Kulkarni is now data science manager at Adobe. According to this definition, **digitalization is more about business operations than either social interactions or business models – although clearly all of these notions are interrelated. (Blumbergs, 2018)**

The Brookings report, in fact, focuses on how digitalization impacts people. "Digitalization is transforming the world of work," according to the report. "The acquisition of digital skills has now become a prerequisite for individual, industry, and regional success." (Blumbergs, 2018)

As organizations implement 'digital technologies' – which in this context really means computers and other information technology – people's jobs change. Imagine factory workers putting down their hammers and lathes and instead using computer-controlled equipment, for example. According to the Brookings report, such change is at the heart of digitalization.

Automation is a major part of the digitalization story, whether it be shifting work roles or transforming business processes generally. In fact, for many people, digitalization applies primarily to such processes. "Digitalization … increases process efficiency and improves data transparency, and of course, it should help boost your top line," explain Georg Tacke, CEO, and Annette Ehrhardt, Global Head of Communications & Marketing Senior Director, Simon-Kucher & Partners . "If you operate an online platform, then your company may already be 80 percent digitalized, and you can gain more efficiency or create more customer value by going the remaining 20 percent of the way." In this example, implementing the technology behind such an online platform isn't the digitalization step per se – it's shifting the business process to such a platform. It seems, therefore, that Gartner's definition that ties digitalization to business operations is on point, as such operations consist of business processes that digital technologies can transform. (Blumbergs, 2018)

Digital Transformation: Beyond Digitalization

Digitalization, however, is quite distinct from digital transformation.

An organization might undertake a series of digitalization projects, ranging from automating processes to retraining workers to use computers. Digital transformation, in contrast, is not something that enterprises can implement as projects. Instead, this broader term refers to the customer-driven strategic business transformation that requires cross-cutting organizational change as well as the implementation of digital technologies. (Blumbergs, 2018) Digital transformation initiatives will typically include several digitalization projects, but executives that believe that there is nothing more to digital transformation than digitalization are making a profound strategic mistake. **In reality, digital transformation requires the organization to deal better with change overall, essentially making change a core competency as the enterprise becomes customer-driven end-to-end. Such agility will facilitate ongoing digitalization initiatives but should not be confused with them. (Blumbergs, 2018)**

12. Green Skills

Coming up with one definition of green skills is also nearly impossible. One way of understanding green skills is looking at how UNIDO (United Nations Industrial Development Organization) defines it. (Arthur Charles, 2022).

Four groups of work tasks that are especially important for green occupations:

WORK TASKS THAT ARE ESPECIALLY IMPORTANT FOR GREEN OCCUPATIONS:

ENGINEERING AND TECHNICAL SKILLS
SCIENCE SKILLS
OPERATION MANAGEMENT SKILLS
MONITORING SKILLS (Arthur Charles, 2022)
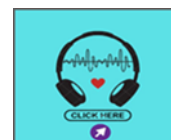
• **Engineering and technical skills:** hard skills encompassing competences involved with the design, construction and assessment of technology usually mastered by engineers and technicians. This know-how is needed for eco-buildings, renewable energy design and energy-saving research and development (R&D) projects.

• **Science skills:** competences stemming from bodies of knowledge broad in scope and essential to innovation activities, for example physics and biology. These skills are especially in high demand in each stage of value chains and in the utility sector, which provides basic amenities such as water, sewage services and electricity.

• **Operation management skills**: know-how related to change in organizational structure required to support green activities and an integrated view of the firm through life-cycle management, lean production and cooperation with external actors, including customers. Such skills are important, for example, for sales engineers, climate change analysts, sustainability specialists, chief sustainability officers and transportation planners.

• **Monitoring skills:** technical and legal aspects of business activities that are fundamentally different way from the remit of engineering or of science. They refer to skills required to assess the observance of technical criteria and legal standards. Examples are environmental compliance inspectors, nuclear monitoring technicians, emergency management directors and legal assistants.

In addition to these skills, a range of soft skills are also considered to be increasingly important, not only for green skills, but generally for "skills of the future", including also those necessary for the Fourth Industrial Revolution. **Skills related to design thinking, creativity, adaptability, resilience, and even empathy, are regarded as critical.**

However, it is important to agree on a common understanding of in the specific business to be able to move in the same direction in all departments. (Deloitte, 2022).

13. Digitalisation Competences Required in for Hospitality Qualifications Including Culinary Arts

The next question appearing is the question: How to find out about the needed skills in different job positions in the hospitality industry?

13.1. ESCO (EUROPEAN SKILLS, COMPETENCES, QUALIFICATIONS AND OCCUPATIONS) IS THE EUROPEAN MULTILINGUAL CLASSIFICATION OF SKILLS, COMPETENCES AND OCCUPATIONS.

What is ESCO? ESCO (European Skills, Competences, Qualifications and Occupations) is the European multilingual classification of Skills, Competences and Occupations.

ESCO works as a dictionary, describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training. Those concepts and the relationships between them can be understood by electronic systems, which allows different online platforms to use ESCO for services like matching jobseekers to jobs on the basis of their skills, suggesting trainings to people who want to reskill or upskill etc. (European Commission, 2023)

ESCO provides descriptions of 3008 occupations and 13.890 skills linked to these occupations, translated into 28 languages (all official EU languages plus Icelandic, Norwegian, Ukrainian, and Arabic). The aim of ESCO is to support job mobility across Europe and therefore a more integrated and efficient labour market, by offering a "common language" on occupations and skills that can be used by different stakeholders on employment and education and training topics. (European Commission, 2023)

Digitalisation presents numerous opportunities for hospitality companies and professionals – this opportunity increases over time because customers embrace the use of technology and see it increasinsgly as a win-win deal that not only keep costs lower but also adds value to the customer experience and make the customer journey smoother and more efficient. Examples can be hotels that use AR to inform their customers about local sights, transportation or restaurant guidance or reception—less check-in. That is why developing digital hospitality competencies is required and will become more important. (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).

"As these more digitally savvy tourists enter the travel market, it allows companies to stay permanently connected with their customers, track their preferences over
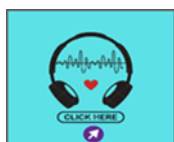
time (Buhalis et al., 2019) and build close relationships and loyalty" (Asperen et al., 2018).

Technology presents unique solutions for restaurants to differentiate themselves and for owners to run their businesses more efficiently. In turn, it leaves more time and energy to focus on servicing guests with more unique dining experiences. Also, big data can offer guest insights that empower hotel and restaurants to personalize their offers in a much more customer-centric way.

> **Companies such as restaurants in the hospitality sector enjoy significant benefits from digitalization competencies. Digitalisation involves the use of sustainable and efficient methods that help support an organization's market position, improve customers service, simplify the booking process, and increase the number of bookings**. (De Peuter-Rutten, J., 2023).
>
> **It is very difficult to answer exactly which skills are the most important and relevant to master. However, according to a large mixed-methods study of the European tourism industry with 1668 respondents, key digital skills include online marketing and communication skills, social media skills, MS Office skills, operating systems use skills and skills to monitor online reviews.** (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).
>
> **Digital competencies can be anything from as simple as following digital news and having an increased social presence on SOME platforms to more technical competencies such as the internet of things, big data, Covid-19-driven touch-free solutions within ordering and payment, table or room reservation system, delivery apps, mobile integration, QR codes, SEO, CRM, automated purchasing systems, augmented reality.** (EHL Insights, 2023).

Olsen et al. (2014, p. 568) found that companies invest in the collection and measurement of customer data but few resources are used to use the data to optimize the organisation and its services and they argue that internal knowledge sharing can help solve this issue. (Carlisle, S., Ivanov, S., Dijkmans, C., 2021)

Several experts in the field of hospitality have proposed a general list of which digitalization competences the sector should strive to obtain. However, it has to be said that it can be difficult and even counter-productive to claim to be able to come up with a set list of generalizable competences that all actors in the hospitality sector need to have as the various market-, organizational- and cultural contexts that hospitality actors operate in differ. One of the competences that have been stressed several times within tourism in the postmodern workplace is **the self-learning competence**: "This skill is necessary to deal with continuous digital innovations and flexibility in the face of constant change and training. **(This**
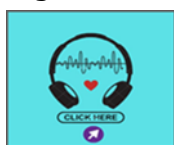
skill includes permanent training, adaptability, and flexibility)." (Touroogle Company, 2022).

It is interesting to notice that the quote argues that digitalization is understood as a constant. That is why hospitality managers need to prioritize constant resources and attention to digitalization of their organisations. Many change management models see change as a temporary process with a start and an ending. However, it might be better to switch to change management models that see change as something – a permanent nature of doing digital business.

13.2. THE MOST PROMINENT NEW SKILLS REQUIRED IN THE NEW CONCEPT OF THE TOURISM INDUSTRY

The most prominent new skills required in the new concept of the tourism industry are:

1. Self-learning capacities; This skill is necessary to deal with continuous digital innovations and flexibility in the face of constant change and training. (This skill includes permanent training, adaptability, and flexibility).

2. Skills for conducting E-business: Includes all the necessary skills for online branding, marketing, distribution, data collection, and analysis.

3. Having a good understanding of artificial intelligence, virtual reality, and augmented reality technologies in all tourism sectors.

4. Other skills needed in the industry include storytelling skills, creativity, and creating a unique customer experience. (Touroogle Company, 2022).

It should be pointed out profession-specific knowledge (about attractions, hotels, food) is still required. (Touroogle Company, 2022).

The World Economic Forum (2016) notes that the most in-demand occupations did not exist ten or even five years ago in many countries. Today, tourism management has become inseparable from technology and communications, and the availability of appropriate digital skills in tourism organizations is crucial. (Touroogle Company, 2022).

ICT integration in high-level decision-making processes is still rare in many tourism organizations. (Touroogle Company, 2022).

Increasing company data volume regarding the number of channels, volume, speed, and variety has significantly created the need to change skills.

Digitalization throughout the tourism ecosystem will help drive the business to build resilience in a post-COVID-19 era. For those tourism sectors that seek automation, the removal of staff can seriously damage the tourist experience and reduce satisfaction while reducing costs. (Touroogle Company, 2022).

The challenge is, how can we use technology in the tourism industry to get the best output? Given the nature of the hospitality industry, it seems unlikely that technology can replace human labor, but it can affect their working formula. (Touroogle Company, 2022).

The travel and tourism industry is one of the industries in which interaction with the consumer is most important. Technological advances allow tourism organizations to get to know their customers better. (Touroogle Company, 2022).

Finally, it should note that every tourism organization must make a digital transformation apart from its long-term policies and programs. (Touroogle Company, 2022).
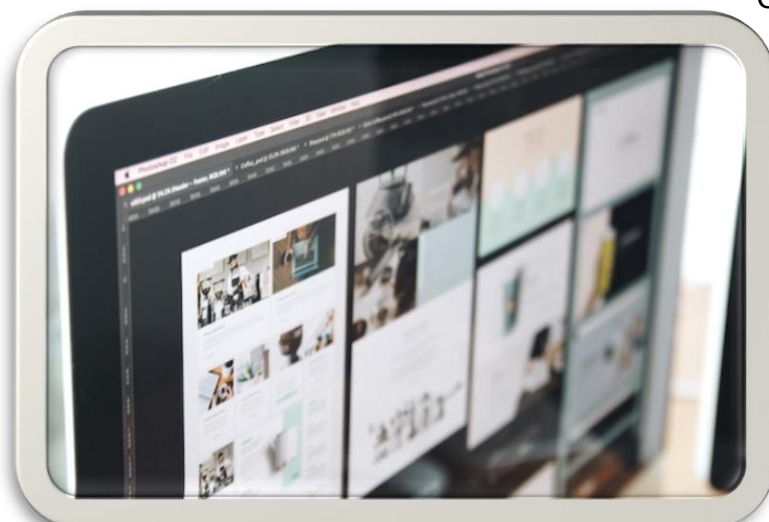
Figure 18, Source: Tranmautritam at pexels.com

The digital transformation strategy in organizations should pay attention to reforming the organizational culture, optimizing the processes by training the tourism industry employees, and implementing more flexible approaches. (Touroogle Company, 2022).

14. Enhancing Digital Skills and Competences for the Digital Transformation: Digital Education Action Plan 2021-2027

In any digital transformation case, it is key to investigate whether current theory applies to reality or whether there is a gap and to investigate not just the digital media but also how the exact case-specific user group interact with the media. To understand digitalisation, we must study the users. "Customer do not see mobile phones as mere channels. For them mobile phones are a lifestyle." (Brian Solis, 2016)

Not only can most hospitality professionals see the clear evidence that many external market changes and developments are digitally driven, they can also experience the immediate effects it has on their own practice in their own workplace and how it ideally simplifies processes. During Covid-19, restaurants introduced more QR codes replacing printed menu cards. On top of preventing the spread of Covid-19, this has clear benefits from a company perspective such as easier change and updates of menus because it can be done digitally without having to print new menus. This digital transformation has clear financial benefits for the restaurant as the electricity costs are limited as guests use their own smart phones – unless they charge them at the restaurant. Also, it has clear sustainable benefits from less printing. However, in order to be digitally sustainable, restaurants must consider to source green electricity from their supplier. (Intelity, 2016)

"A few years ago, InterContinental Hotels completely replaced print Bibles with digital versions loaded on Kindle e-readers. In the long term, the move could prove to be highly efficient. Guests can access a variety of reading material from the devices for expanded entertainment options rather than buying and replacing new books." (Intelity, 2016)

The European Centre for the Development of Vocational Training (Cedefop, 2018) states that technological changes are the major driver of organsiational change. **According to Cedefop's "European skills and jobs survey" about 85% of all EU jobs need at least a basic digital skills level. However, it is not sufficient to only focus on digital skills. It is also required more and more to possess a combination of cognitive and socio-emotional skills such as co-operation, learning- and communication skills (Cedefop, 2018, p. 13).**

Within organizational communication, the notion of the communicative constitution of organizations (CCO) is at the center of a growing theoretical understanding. CCO scholarship is based on the idea that communication is not
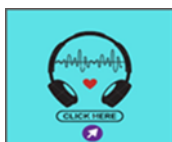
just an instrument, and that organization emerges in and is sustained and transformed by communication. (Schoeneborn, D., Vásquez, C., 2017).

On par with CCO, it can be argued that the hospitality organisation emerges in, is sustained and transformed by the digital transformation of work. This means that enhancing digital skills means enhancing not just tools and instruments but also mindsets, perspectives and processes. Digital transformations are not limited to isolated tools and functions but offers a formative opportunity to re-design the whole notion of the organisation and hospitality as we know it. (Busulwa, R., Pickering, M., Mao, I., 2022).

Digital transformation is a powerful force as it has a constituting effect which means that it is not limited to transforming hospitality tools but also has the potential to re-imagine and recreate all areas of hospitality and even hospitality mind sets. To explain the power and the importance of digital transformation, it may be helpful to consider the social constructionist view of the organisation in which (digital) communication (re-)constructs the perception of the organisation. The same way, digital communication and digital transactions exchange information, it also shapes the hospitality organisation. Digital transformation tranforms the role and tasks of hospitality actors in everything from who takes orders in McDonalds and who does the check-in at the airport to who drives the metro. (Busulwa, R., Pickering, M., Mao, I., 2022).

This digital transformation of hospitality has at least two obvious consequences for businesses. Businesses can either cut employee costs or they can transfer the role of the employee and set the employee free to perform a different task that cannot yet be substituted by robots. Much of the change and innovation in most sectors, markets and organisations comes from digital transformation. To give a few hospitality examples, just think of OTAs such as hotels.com, booking.com and trip.com or Airbnb, Über, Trustpilot.com and Tripadvisor.com. The examples show that newcomers in the hospitality industry seem to capitalize on their digital skills and all the opportunities a lot more than existing companies. It could perhaps be argued that market newcomers experiment more with their digital skills than already established companies which rely on older business models and habits. Perhaps existing companies perceive digitalization as to difficult to fully embrace because of all the changes it brings along whereas new companies do not have an existing foundation and thus have to build everything from scratch and in this way perceive digital transformation much more positively with a higher interest in a constitutive understanding of the digital transformation and organisation relation.

"Effectively delivering on this digital transformation imperative requires new or enhanced organization capabilities such as digital innovation (e.g., see Warner
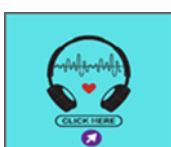
and Wäger, 2019; Nambisan et al., 2017), digital customer engagement (e.g., see Eigenraam et al., 2018), digital customer experience management (e.g., see Weill and Woerner, 2013), and more." (Busulwa, R., Pickering, M., Mao, I., 2022).

Figure 19, Source: Pixabay at pexels.com

15. Developing Digital Competence for Employability in the Hospitality industry: Engaging and Supporting Stakeholders with the Use of DigComp 2.0, 2.1, 2.2.

To join DigComp-related Communities of Practice (CoPs):

There are two CoPs to support implementation of DigComp in Member States – **the DigComp CoP and the Digital Skills Certification CoP.**

Both of these are hosted by All Digital, which offers different interest points on DigComp from policy, research, education and training to employability and human resources development, inclusion projects and others. DigComp CoP and Digital Skills Certification CoP hosted by All Digital. The CoPs are free and open to all stakeholders to join.

DigComp was first published in 2013, as a reference framework to support the development of digital competence of individuals in Europe. DigComp describes which competences are needed today to use digital technologies in a confident, critical, collaborative and creative way to achieve goals related to work, learning, leisure, inclusion and participation in our digital society. (European Commission, 2018).

Stakeholder management and engagement offers a large pool of resources to tap into if companies can motivate stakeholders to participate in the value creation process. Here, it helps to be a purpose-driven company, to have a compelling cause apart from profits. Sustainability lends itself to be that stakeholder engaging factor. Research among millennials seem to offer evidence that millennials are very motivated by sustainability and that they have a strong stake in empowering the green agenda. **"87% [of millennials] would be more loyal to a company that helps them contribute to social and environmental issues."** (Fischer, D., 2018).

Millennials are born digital which means they are trained in searching for information via smart phones about issues and they will have the internet and social media at their disposal to share sustainability flaws and gaps they might identify about companies trying to green wash. "Companies need to be careful about simply choosing a social problem to look good and meaningful on their website." (Fischer, D., 2018).

The fast pace of digitalisatin is problematic because it makes strategic planning and linear strategizing difficult. "Digitisation and Web 4.0 is redefining jobs and is
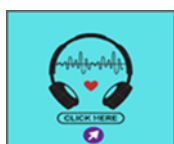
also creating new ones, which requires new competences and skills (Hsu, 2018). This leads to the important question of how digital skills in tourism organisations are currently covered and what the expectations are for the future." (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).

Organisations and workers have to adapt and even that is in many cases not enough because many organisations and jobs simply do not exist in the near future. (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).

A way to make the orgsanisation more able to sustain could be to develop digital competence. This requires an organizational set-up and architecture that support not just employees but also the organisation's key stakeholder groups enabling stakeholders to work together on the same digital platforms. (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).

"According to Langford et al. (2019), the future of the travel experience should be a seamless blend of talent and technology where machines are tasked to do more of the computer-based work, thus freeing humans to provide better service experiences and more meaningful connections and enabling large companies to interact with their clients in similar ways as small businesses who really know their customers." (Carlisle, S., Ivanov, S., Dijkmans, C., 2021).

The notion of the post-modern organisation argues that work more and more often does not only take place internally in the organization. The borders of what we refer to as the organisation has become much more muddy and unclear as value creation increasingly takes place in a network-structured co-creation process with stakeholders which is not limited to the previous boundaries of the organisation. The digital network offers the possibility to connect, empower and structure the value creation process between the organisation's key stakeholders. However, one of the challenges with developing digital competence among stakeholders is the power of economies of scale and scope as smaller stakeholders sometimes refrain from building digital competences and systems because of their limited scale and scope.

During the recent years, the young generation of hospitality students and professionals seem to have institutionalised the use of digital products and taken on a digital lifestyle. If this notion is true, it supports their own employability because it can be argued that they can approach work with a more digital mindset. However according to the paper titled Self-confidence and digital proficiency by Gómez et al, "there is no evidence about the sociological and biographical determinants that influence subjects' self-perception of their level of digital skills,
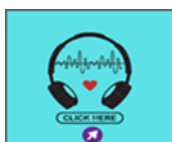
Figure 20, Source: Anna Shvet at pexels.com
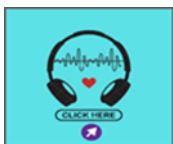
particularly among young people, since this generational group is generally associated with a high level of digital skills." (Gomez, Orti, Kuriz, 2022).

The paper points out that home-schooling during Covid-19 revealed a general inequal gap between young people's rather high self-perception of their digital competences and their actual real digital competences. To be able to nurture and build digital self-confidence, we must first try to understand that the lack of digital self-confidence means that people feel vulnerable and insecure. **According to Gómez et al, "digital vulnerability is mediated by acquired cultural patterns over the use of technology."** (Gomez, Orti, Kuriz, 2022).

16. The development of self-confidence respect to green, digital and digitalization skills

Self-confidence can be defined as "a feeling of trust in one's abilities, qualities, and judgement" (Oxford University Press), 2023). It is thus fair to argue that it is fundamental with a certain level of self-confidence to function professionally as the profession of hospitality demands that its professionals can make use of their abilities, qualities, and judgement in numerous situation such as servicing guests and making decisions in a hotel reception. A typical blind spot and misunderstanding can be that a hospitality professional can possess a good general level of self-confidence and at the same time lack self-confidence in green, digital and digitalization skills.

There are many explanations to this, one being that green, digital and digitalization skills have previously in most cases not been a core part of the curriculum in hospitality education or practice which means that both organisations and professionals have had to adjust their routines and practices which requires time, patience and resources which often are lacking in a faced-paced, efficient hospitality environment.

The faced-paced organizational environment is not the only learning barrier and self-confidence challenge. Also, the rapid evolvement and fast-paced change of digital competences means that today's required digital competences quickly become outdated by the requirements of tomorrow's reality which can demotivate management from investing in digital technology and skills and employees from investing their time and efforts into the green and digital area of their work area. The high level of turbulence can make hospitality employees refrain from wanting to work with digitalization and thus lose self-confidence.

Like digital skills, green skills are also part of what can be defined as a wicked problem or challenge because of the lack of straight-forward solutions and strategies. Green skills are part of a highly complex area as sustainability is hard to isolate. Often is has many implications that can be hard to predict and foresee. More and more professionals have now realized that the green and the digital evolution is here to stay and cannot be ignored. Realizing that this turbulent rapid change-perspective is here to stay means that hospitality professionals have to accept that they have to embrace digitalization not as an end result but more as an eternal process, movement and organizational way-of-life.

That is why it can be argued that to build more self-confidence, learners and their teachers and managers must accept:

1.   the fact that the green and digital trend is a train that you have to get on the sooner the better.

2.   That a focus on the process rather than the end result can help build more self-confidence among hospitality professionals.

Figure 21, Source: Manuel Geissinger at pexels.com
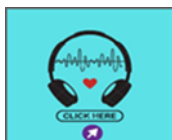
17. The Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist

In DigComp, 5 competence areas outline what the digital competence entails. They are the following: Information and data literacy; Communication and collaboration; Digital content creation; Safety; and Problem solving. (DigComp, 2023). The DigComp framework is very detailed aimed at eight levels of proficiency. The authors of the book designed **the Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist** with the focus on sustainable hospitality digitalisation. Below is a summative review of the five areas of focus.

Table 3: The Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist
On the basis of DigComp 2.2 (2023)

Information and data literacy	Communication and collaboration	Digital content creation	Safety	Problem-solving
To articulate information needs, to locate and retrieve digital data, information and content for sustainable hospitality digitalisation.	To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity for sustainable hospitality and digitalisation of it	To create and edit digital content for sustainable hospitality and digitalisation of it.	To protect devices, content, personal data and privacy in digital environments of the hospitality company for sustainable hospitality digitalisation.	To identify needs and problems, and to solve conceptual problems and problem situations in digital environments for sustainable hospitality digitalisation
To judge the relevance of the source and its content for sustainable hospitality digitalisation.	To participate in society through public and private digital services and participatory citizenship for sustainable hospitality and digitalisation of it.	To improve and integrate information and content info an existing body of knowledge while understanding how copyright and licences are to be applied for sustainable hospitality and digitalisation of it.	To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion within the hospitality company for sustainable hospitality and digitalisation of it.	To use digital tools to innovate processes and products for sustainable hospitality digitalisation
To store, manage, and organize digital data, information and content for sustainable hospitality	To manage one's and organisation's digial presence, identity and reputation for sustainable	To know how to give understandable instructions for a computer system of a hospitality company for		To keep up-to-date with the digital evolution for sustainable hospitality digitalisation.

digitalisation	hospitality	sustainable	To be aware
digitalisation .	hospitality digitalisation	hospitality digitalisation	of the environmental impact of digital technologies and their use for sustainable hospitality digitalisation

Table 4: 1.1 BROWSING, SEARCHING AND FILTERING DATA, INFORMATION AND DIGITAL CONTENT for sustainable hospitality digitalisation On the basis of DigComp 2.2 (2023)	
DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
1.INFORMATION AND DATA LITERACY	1.1 BROWSING, SEARCHING AND FILTERING DATA, INFORMATION AND DIGITAL CONTENT for sustainable hospitality digitalisation To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies to ensure sustainable hospitality digitalisation

Table 5: 1.2 EVALUATING DATA, INFORMATION AND DIGITAL CONTENT On the basis of DigComp 2.2 (2023)	
DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
1.INFORMATION AND DATA LITERACY	1.2 EVALUATING DATA, INFORMATION AND DIGITAL CONTENT for sustainable hospitality digitalisation To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content, to analyse, interpret and critically evaluate the data, information and digital content for ensuring sustainable hospitality digitalisation

Table 6: 1.3 MANAGING DATA, INFORMATION AND DIGITAL CONTENT for sustainable hospitality digitalisation On the basis of DigComp 2.2 (2023)	
DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
1.INFORMATION AND DATA LITERACY	1.3 MANAGING DATA, INFORMATION AND DIGITAL CONTENT for sustainable hospitality digitalisation To organise, store and retrieve data, information, and content in digital environments, to organise and process them in a structured environment for sustainable hospitality digitalisation

Table 7: 2.1   INTERACTING THROUGH DIGITAL TECHNOLOGIES for sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.1 INTERACTING THROUGH DIGITAL TECHNOLOGIES for sustainable hospitality digitalisation To interact through a variety of digital technologies and to understand appropriate digital communication for sustainable hospitality digitalisation

Table 8: 2.2 SHARING THROUGH DIGITAL TECHNOLOGIES for sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.2 SHARING THROUGH DIGITAL TECHNOLOGIES To share data, information and digital content with others through appropriate digital technologies, to act as an intermediary, to know about referencing and attribution practices for sustainable hospitality digitalisation

Table 9: 2.3 ENGAGING CITIZENSHIP THROUGH DIGITAL TECHNOLOGIES for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.3 ENGAGING CITIZENSHIP THROUGH DIGITAL TECHNOLOGIES for ensuring sustainable hospitality digitalisation To participate in society through the use of public and private digital services, to seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies for ensuring sustainable hospitality digitalisation

Table 10: 2.4 COLLABORATING THROUGH DIGITAL TECHNOLOGIES for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.4 COLLABORATING THROUGH DIGITAL TECHNOLOGIES for ensuring sustainable hospitality digitalisation To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge for ensuring sustainable hospitality digitalisation

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
	Table 11: 2.5 NETIQUETTE for ensuring sustainable hospitality digitalisation On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.5 NETIQUETTE for ensuring sustainable hospitality digitalisation To be aware of behavioural norms and know-how while using digital technologies and interacting in digital Environments, to adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments for ensuring sustainable hospitality digitalisation

Table 12: 2.6 MANAGING DIGITAL IDENTITY for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
2. COMMUNICATION AND COLLABORATION	2.6 MANAGING DIGITAL IDENTITY for ensuring sustainable hospitality digitalisation To create, and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services for ensuring sustainable hospitality digitalisation

Table 13: 3.1 DEVELOPING DIGITAL CONTENT for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
3. DIGITAL CONTENT CREATION	3.1 DEVELOPING DIGITAL CONTENT for ensuring sustainable hospitality digitalisation To create and edit digital content in different formats, to express oneself through digital means for ensuring sustainable hospitality digitalisation

Table 14: 3.2 INTEGRATING AND RE-ELABORATING DIGITAL CONTENT for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
3. DIGITAL CONTENT CREATION	3.2 INTEGRATING AND RE-ELABORATING DIGITAL CONTENT for ensuring sustainable hospitality digitalisation To modify, refine and integrate new information and content into an existing body of knowledge and
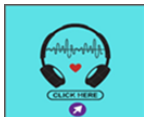
	resources to create new, original and relevant content and knowledge for ensuring sustainable hospitality digitalisation

Table 15: 3.3   COPYRIGHT AND LICENCES for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
3. DIGITAL CONTENT CREATION	3.3 COPYRIGHT AND LICENCES for ensuring sustainable hospitality digitalisation To understand how copyright and licences apply to digital information and content for ensuring sustainable hospitality digitalisation

Table 16: 3.4   PROGRAMMING for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
3. DIGITAL CONTENT CREATION	3.4 PROGRAMMING for ensuring sustainable hospitality digitalisation To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task for ensuring sustainable hospitality digitalisation

Table On the basis of DigComp 2.2 (2023)16: 4.1 PROTECTING DEVICES for ensuring sustainable hospitality digitalisation

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
4. SAFETY	4.1 PROTECTING DEVICES for ensuring sustainable hospitality digitalisation To protect devices and digital content, and to understand risks and threats in digital environments, to know about safety and security measures and to have a due regard to reliability and privacy for ensuring sustainable hospitality digitalisation

Table 17: 4.2   PROTECTING PERSONAL DATA AND PRIVACY for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
4. SAFETY	4.2 PROTECTING PERSONAL DATA AND PRIVACY for ensuring sustainable hospitality digitalisation

	To protect personal data and privacy in digital environments for ensuring sustainable hospitality digitalisation To understand how to use and share personally identifiable information while being able to protect oneself and others from damages for ensuring sustainable hospitality digitalisation To understand that digital services use a "Privacy policy" to inform how personal data is used for ensuring sustainable hospitality digitalisation

Table 18: 4.3 PROTECTING HEALTH AND WELL-BEING for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
4. SAFETY	4.3 PROTECTING HEALTH AND WELL-BEING for ensuring sustainable hospitality digitalisation To be able to avoid health risks and threats to physical and psychological well-being while using digital technologies for ensuring sustainable hospitality digitalisation To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying) for ensuring sustainable hospitality digitalisation To be aware of digital technologies for social well-being and social inclusion for ensuring sustainable hospitality digitalisation

Table 19: 4.4 PROTECTING THE ENVIRONMENT for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
4. SAFETY	4.4 PROTECTING THE ENVIRONMENT for ensuring sustainable hospitality digitalisation To be aware of the environmental impact of digital technologies and their use for ensuring sustainable hospitality digitalisation

Table 20: 5.1 SOLVING TECHNICAL PROBLEMS for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
5. PROBLEM SOLVING	5.1 SOLVING TECHNICAL PROBLEMS for ensuring sustainable hospitality digitalisation To identify technical problems when operating devices and using digital environments, and to solve them (from

	trouble-shooting to solving more complex problems) for ensuring sustainable hospitality digitalisation

Table 21: 5.2   IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
5. PROBLEM SOLVING	5.2. IDENTIFYING NEEDS AND RESPONSES for ensuring sustainable hospitality digitalisation To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them for ensuring sustainable hospitality digitalisation To adjust and customise digital environments to personal needs (e.g. accessibility) for ensuring sustainable hospitality digitalisation

Table 22: 5.3   CREATIVELY USING DIGITAL TECHNOLOGY for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
5. PROBLEM SOLVING	5.3 CREATIVELY USING DIGITAL TECHNOLOGY for ensuring sustainable hospitality digitalisation To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments for ensuring sustainable hospitality digitalisation

Table 23: 5.4   IDENTIFYING DIGITAL COMPETENCE GAPS for ensuring sustainable hospitality digitalisation
On the basis of DigComp 2.2 (2023)

DIMENSION 1 COMPETENCE AREA	DIMENSION 2 COMPETENCE
5. PROBLEM SOLVING	5.4 IDENTIFYING DIGITAL COMPETENCE GAPS for ensuring sustainable hospitality digitalisation To understand where one's own digital competence needs to be improved or updated for ensuring sustainable hospitality digitalisation To be able to support others with their digital competence development for ensuring sustainable hospitality digitalisation To seek opportunities for self-development and to keep up-to-date with the digital evolution for ensuring sustainable hospitality digitalisation

18. Digital Competence Framework for Citizens On the basis of DigComp 2.0, 2.1, 2.2

The following is based on the DigCom edition 2.2. In March 2022 this fourth edition/iteration of the framework was published.

The Digital Competence Framework for Citizens (DigComp) provides a common understanding of what digital competence is.

"...the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It is defined as a combination of knowledge, skills, and attitudes." (Council Recommendation on Key Competences for Life-long Learning, 2018).

The purpose of the framework is helping EU citizens to become digitally competent. DigComp is used for multiple purposes, such as designing competence assesment tools, creating training courses and materials, and identifying professional digital profiles, in the contexts of employment, education and training, and social inclusion. In this context we focus on the meaning and use of the DigComp in a sustainable digital context in the hospitality industry. Though the digital competences focus on digital skills both as a European citizen and a European employee. (European Commission, 2022)

Figure 22, Source: European Commission, 2022. DigComp 2.2 framework

In the text below the different focus areas of the framework will be explained very briefly and put in the context of the Hospitality business.
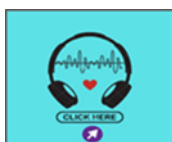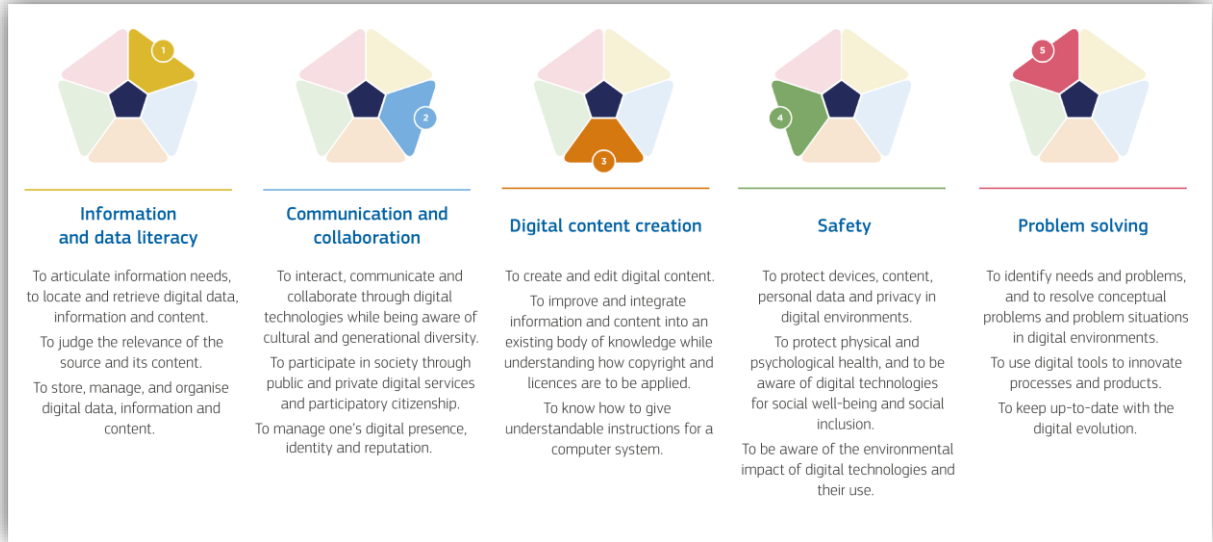
Figure 23, Source: DigComp 2.2 Framework

Figure 24, Source DigCopmp 2.2 framework

18.1. INFORMATION AND DATA LITERACY

Table 24: Information and Data Literacy

COMPETENCE	EXAMPLES
SEARCHING AND FILTERING DATA **Browsing, searching and filtering data, information and digital content** To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies.	KNOWLEDGE ABOUT Aware that search results, social media activity streams and content recommendations on the internet are influenced by a range of factors. These factors include the search terms used, the context (e.g. geographical location), the device (e.g. laptop or mobile phone), local regulations (which sometimes dictate what can or cannot be shown), the behaviour of other users (e.g. trending searches or recommendations) and the user's past online behaviour across the internet.
INFORMATION AND DIGITAL CONTENT **Evaluating data, information and digital content** To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content.	Develops effective search methods for personal purposes (e.g. to browse a list of most popular films) and professional purposes (e.g. to find appropriate job advertisements).
BROWSING **Managing data, information and digital content** To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.	Concerned that much online information and content may not be accessible to people with a disability, for example to users who rely on screen reader technologies to read aloud the content of a web page

Source: DigCopmp 2.2 Framework

18.2. COMMUNICATION AND COLLABORATION

Table 25: Communication and Collaboration

COMPETENCE	EXAMPLES
INTERACTING THROUGH DIGITAL TECHNOLOGIES To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.	Aware which communication tools and services (e.g. phone, email, video conference, social network, podcast) are appropriate in specific circumstances (e.g. synchronous, asynchronous), depending on the audience, context and purpose of the communication. Aware that some tools and services also provide an accessibility statement. (DA)
SHARING THROUGH DIGITAL TECHNOLOGIES To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices	Willing to share expertise on the internet, for example through intervening in online forums, contributing to Wikipedia or through creating Open Educational Resources. Open towards sharing digital content that might be interesting and useful to others.
ENGAGING CITIZENSHIP THROUGH DIGITAL TECHNOLOGIES To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.	Aware of civil society platforms on the internet that offer opportunities for citizens to participate in actions targeting global developments to reach sustainability goals on local, regional, national, European and international level.
COLLABORATING THROUGH DIGITAL TECHNOLOGIES To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge.	While organising an event for my organisation, I can solve problems that arise while writing and communicating in digital environments, (e.g. inappropriate comments about my organisation in a social network). I can create rules from this practice for my current and future colleagues to implement and use as a guide.
MANAGING DIGITAL IDENTITY To create, and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.	Can propose and use different media strategies (e.g. Survey on FaceBook, Hashtags on Instagram and Twitter) to empower the citizens of my city to participate in defining the main topics of an event on the use of sugar in food production.
NETIQUETTE To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.	Aware of the meaning of non-verbal messages (e.g. smiley faces, emojis) used in digital environments (e.g. social media, instant messaging) and knowing that their use can culturally differ between countries and communities.

Source: DigCopmp 2.2 Framework
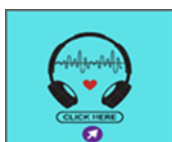
18.3. DIGITAL CONTENT CREATION

Table 26: Digital Content Creation

COMPETENCE	EXAMPLES
DEVELOPING DIGITAL CONTENT To create and edit digital content in different formats, to express oneself through digital means.	develop a short course (tutorial) to train the staff on a new procedure to be applied in the organisation With the help of a colleague (who has advanced digital competence and who I can consult whenever I need) and having as support a tutorial video with the steps on how to do it:
COPYRIGHT AND LICENCES To understand how copyright and licences apply to digital information and content.	Knows that digital content, goods and services might be protected under intellectual property (IP) rights (e.g. copyright, trademarks, designs, patents).
PROGRAMMING To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or to perform a specific task.	Knows that computer programs are made of instructions, written according to strict rules in a programming language.

Source: DigCopmp 2.2 Framework
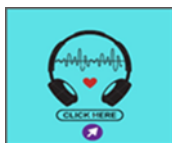
18.4. SAFETY

COMPETENCE	EXAMPLES
PROTECTING DEVICES To protect devices and digital content, and to understand risks and threats in digital environments.To know about safety and security measures and to have a due regard to reliability and privacy.	can protect the corporate Twitter account using different methods (e.g. a strong password, control the recent logins) and show new colleagues how to do it.
PROTECTING PERSONAL DATA AND PRIVACY To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.	can assess whether personal data are used on the Corporate Twitter appropriately according to the European Data Protection Law and Right to be Forgotten.
PROTECTING HEALTH AND WELL-BEING To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.	Knows how to apply, for oneself and others, a variety of digital usage monitoring and limitation strategies (e.g. rules and agreements on screen-free times, delayed availability of devices for children, installing time limitation and filter software).
PROTECTING THE ENVIRONMENT To be aware of the environmental impact of digital technologies and their use.	Knows how to use digital tools to improve the environmental and social impact of one's consumer behaviour (e.g. by looking for local produce, by searching for collective deals and car-pooling options for transportation).

Table 27: Safety

Source: DigCopmp 2.2 Framework
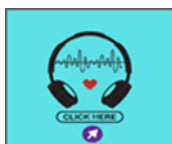
18.5. PROBLEM SOLVING

COMPETENCE	EXAMPLES
SOLVING TECHNICAL PROBLEMS To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).	Helped by a colleague from the IT department: • I can create an illustrated video which answers questions on the sustainable use of digital devices in organisations of my sector, to be shared on Twitter, and to be used by staff and by other professionals in the sector. Helped by a colleague from the IT department: • I can create an illustrated video which answers questions on the sustainable use of digital devices in organisations of my sector, to be shared on Twitter, and to be used by staff and by other professionals in the sector.
IDENTIFYING NEEDS AND TECHNOLOGICAL RESPONSES To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).	
CREATIVELY USING DIGITAL TECHNOLOGY To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.	
IDENTIFYING DIGITAL COMPETENCE GAPS To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.	

Table 28: Problem Solving

Source: DigCopmp 2.2 Framework

19. Approaches to Embed Sustainability ESDGC in the Content of Hospitality Digitalization

First, the meaning of the abbreviation ESDGC must be clear. It means Education for Sustainable Development and Global Citizenship. A worldwide plan negotiated in a Unesco context aiming to focus on education and training of all citizens in the world – the global citizen – as a tool to achieve the SDGs (Sustainable development goals). SDG 4 is in focus because we need to strengthen the education and learning/reorientation. (UNESCO, 2022).

To be able to plan learning activities promoting sustainability there has to be another focus beside direct skills needed to work with digitalization in the hospitality industry. No matter if you are a teacher, learner or employee in the industry.

GCED ENTAILS THREE CORE CONCEPTUAL DIMENSIONS

Cognitive
To acquire knowledge, understanding and critical thinking about global, regional, national and local issues and about the interconnectedness and interdependency of different countries and populations.

Socio-emotional
To feel one belongs to a common humanity, sharing values and responsibilities, empathy, solidarity and respect for differences and diversity.

Behavioural
To act effectively and responsibly at local, national and global levels for a more peaceful and sustainable world.

Figure 25, Source: UNESCO, 2022

COMMON VISION OF GCED AND ESD:
empower learners of all ages to become proactive contributors
to a more just, peaceful, tolerant, inclusive and sustainable world

Global Citizenship Education

Aims
- create a sense of belonging to the global community and common humanity
- create respect for the universal values of human rights, democracy, non-discrimination and diversity
- empower learners to engage and assume active roles to shape a more peaceful, tolerant, inclusive world

Associated themes
- peace and human rights
- intercultural understanding
- citizenship education
- respect for diversity and tolerance
- inclusiveness

Commonalities

Vision
- empower learners of all ages to become proactive contributors to a more just, peaceful, tolerant, inclusive and sustainable world

Holistic pedagogy
- learning contents/outcomes but also
- learning process and environment

Transformative purpose
- emphasis on action, change and transformation

Acquisition of wider skills
- acquisition of values, attitudes
- skills for collaboration, communication and critical thinking

Education for Sustainable Development

Aims
- empower learners to take informed decisions and responsible actions for:
  - environmental integrity
  - economic viability
  - a just society, for present and future generations

Associated themes
- climate change
- biodiversity
- disaster risk reduction
- sustainable consumption
- poverty eradication

Figure 26, Source: UNESCO, 2022

19.1. The Metaphor of Embedding

The metaphor of embedding describes the process of integrating a desirable element deeply into a system. It is built firmly into the system, as opposed to merely being bolted on to it. The embedded element, however, is still discernible and it does not immediately transform the system, although it may well improve its function.

Embedding is a strategy that opens up possibilities for transforming the education system from within by paving a way to an interdisciplinary curriculum, issue-based learning and whole-school approaches.

The metaphor of infusion, on the other hand, describes the process of a desirable essence permeating and transforming the milieu in which the system operates.

When infusion refers to the process of dissolving flavours from plant material, an infusion is also the name for the resultant liquid or solution. In this sense, infusion is a strategy for ESD integration that is deeper than embedding and is an ultimate solution. (UNESCO MGIEP, 2017, p.18).

Embedding is about reorienting subjects into serving a more socially and globally relevant purpose: that of contributing to a sustainable, just and peaceful world, with young people motivated, prepared and empowered to address persistent and emerging local and global challenges. (UNESCO MGIEP, 2017, p.19).

Embedding, therefore, strategically promotes double-purpose learning, where students acquire subject knowledge and skills and, at the same time, learn how to contribute to a sustainable transformation of society – they learn to live together with a deep respect for the environment and dignity for all. (UNESCO MGIEP, 2017, p.19).

UNESCO MGIEP, 2017, p.19, refer to the model 'Responses to the challenge of sustainable development', adapted from Sterling 2004 as cited in Lotz-Sisitka et al (2015) p.73:

Table 29: Responses to the challenge of sustainable development

Responses to the challenge of sustainable development		Corresponding ESD mainstreaming strategies	
(a) Denial I	It's a hype that will go away	No action	
(b) Bolt on	Add a 'green aspect' to a curriculum or a programme	Adding on	
(c) Built in	Important enough to integrate in all we do	**Embedding**	Integration
(d) Whole system redesign	We need to rethink the very foundations of what we currently do	Infusion	
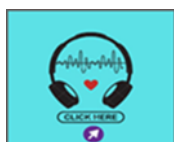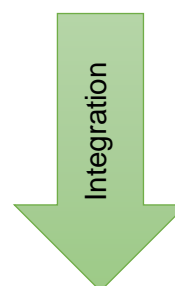
20. Development of Entrepreneurial Ideas to Benefit from Competences

Entrepreneurial skills and digital competence are two basic competences in people's education in the 21st century. They are also transversal competences in university degrees. We carried out an analysis of European models, which suggest areas and indicators within these two competencies (entrepreneurial and digital), with the ultimate goal of elaborating an original model of digital entrepreneurship competence, which we have named EmDigital. (Prendes-Espinosa, P., Solano-Fernández, I. M., García-Tudela, P.A. (2021).

In general terms, the EmDigital model is composed of a total of 15 competences, distributed as follows: dimension 1 of identification of opportunities (three sub-competences); dimension 2 on action planning (three sub-competences); dimension 3 of implementation and collaboration (four sub-competences); and finally, dimension 4, related to management and safety (five sub-competences). (Prendes-Espinosa, P., Solano-Fernández, I. M., García-Tudela, P.A. (2021).

With the aim of favoring the practical realization of the EmDigital model, each one of the 15 sub-competencies described is summed up with different indicators, as in the reference models (EntreComp and DigComp). A total of 45 indicators form the EmDigital model. (Prendes-Espinosa, P., Solano-Fernández, I. M., García-Tudela, P.A. (2021).
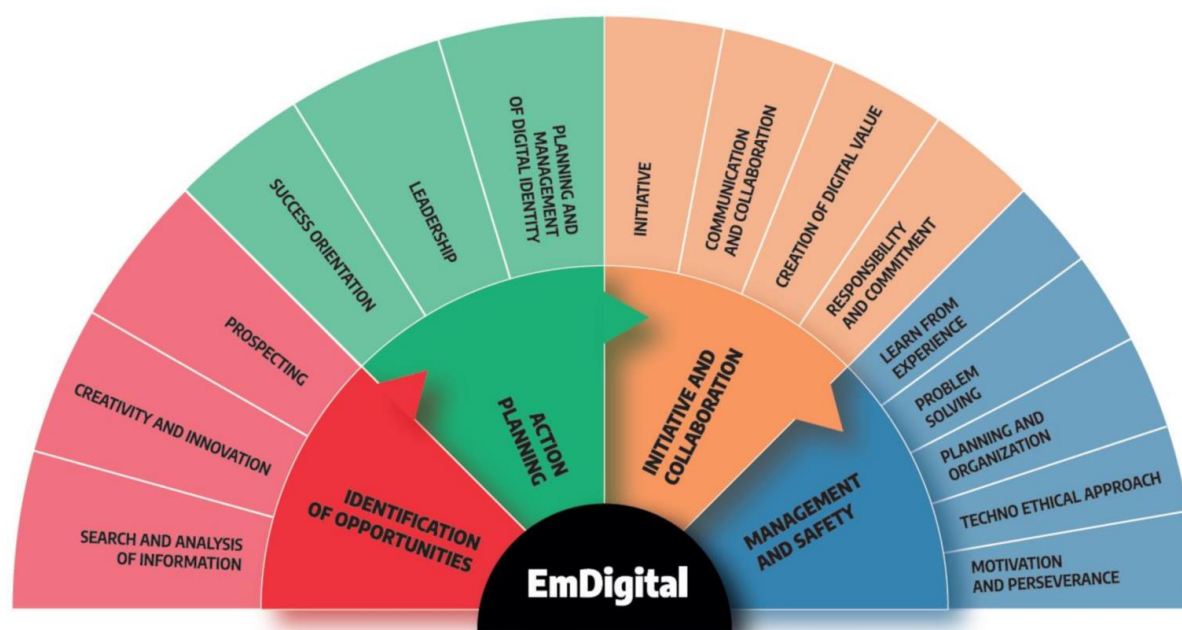
Figure 27, (Prendes-Espinosa, P., Solano-Fernández, García-Tudela, P.A. (2021). EmDigital.

The Relation between EmDigital Model and Open Innovation

At a time like the present, in which technology is a key element in sociocultural evolution and business development, it is necessary to consider what an entrepreneur needs to know in order to develop and succeed in a digital context.

Entrepreneurship today is not limited to a specific field, such as technology and business degrees. According to [Mastrostefano, K, et al, 2020], open innovation is a strategy that can promote the success of any start-up. Our model could therefore be a good support for such a strategy because we have a complete collection and description of the main competences of digital entrepreneurs. (Prendes-Espinosa, P., Solano-Fernández, I. M., García-Tudela, P.A. (2021).

However, EmDigital is not only a model to improve the initial digital entrepreneurship training of university graduates [Vargas-Larraguivel, P.A. et al, 2021] but also an opportunity to improve the innovation process of companies by reflecting on what it means to be a successful entrepreneur. In this sense, we consider that the EmDigital model can be a breakthrough opportunity for any type of entrepreneurship: the entrepreneurship of novice entrepreneurs, the intra-entrepreneurship of employees and organizational entrepreneurship [Yun, J.J. et al, 2021].

In conclusion, this model is aimed at university students who are going to start their working life, but future research can use this model to evaluate competences of workers and to design processes to improve their digital entrepreneurship.

Description of the competences and sub-competences of the EmDigital model.

Table 30: Responses to the challenge of sustainable development		
Dimension	**Sub-Competence**	**Description**
1. Identification of opportunities	C1. Search for and analysis of information	Research and selection of ideas as a point of departure for the creation of an opportunity or entrepreneurial endeavor.
	C2. Creativity and innovation	Identification of the potential innovative values, which can be applied to the entrepreneurial initiative and concretion of creative ideas to tackle current challenges.
	C3. Prospecting	Exploring the real opportunities of the process of development and implementation of ideas in the immediate future.
2. Action planning	C4. Success orientation	Individual and collective efforts to transform the original idea into a reality in the best possible manner.
	C5. Leadership	Capacity to engage and mobilize the work group and influence exerted upon it to set further actions. Promoting the necessary initiatives to optimize the attainment of the objectives established.
	C6. Planning and management	Clear and understandable definition of the digital identity and the different digital sub-identities
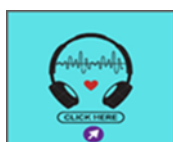
Table 30: Responses to the challenge of sustainable development

Dimension	Sub-Competence	Description
	of digital identity	included in it that project any proposal of digital entrepreneurship.
3. Initiative and collaboration	C7. Initiative	Carrying out of the process by which an individual finds the motivations and necessary support to start creating value.
	C8. Communication and collaboration	Interaction and formal and informal discussion in open or private digital spaces on specific issues and related to the action undertaken.
	C9. Creation of digital value	Development of the digital content related to the initiative, for its further sharing with society or the community or the corresponding actors.
	C10. Responsibility and commitment	Assumption of obligations and personal and ethical involvement (like the use of copyright and licenses) acquired throughout the process of inception and development of an idea, which can generate value.
4. Management and safety	C11. Learning from experience	Evaluation of the different actions implemented to optimize the processes and enhance the accomplishment of the objectives.
	C12. Problem solving	Intervention or mediation when solving technical, communication, management or other type of problems.
	C13. Planning and organization	Appraisal of the degree of accomplishment of the objectives set and classification of stored information.
	C14. Techno-ethical approach	Minimization of the potential risks that the design and/or implementation of the proposal could entail and commitment to regular updating.
	C15. Motivation and perseverance	Crafting an individualized and transferable sense of commitment to ensure the progress of the initiative.

Table 31: Responses to the challenge of sustainable development

Indicators of the EmDigital model. Sub-Competences	Indicators
	C1.1. Development of searches implementing information organization and management mechanisms.

Table 31: Responses to the challenge of sustainable development

Indicators of the EmDigital model. **Sub-Competences**	**Indicators**
C1. Search for and analysis of information	C1.2. Identification of entrepreneurship needs or opportunities within a virtual or based-on-technologies face-to-face environment.
	C1.3. Assessment of limitations, opportunities and risks of potential entrepreneurship with technologies.
C2. Creativity and innovation	C2.1. Specification of the most adequate digital contents and tools to respond to the possibilities found.
	C2.2. Specification of ideas and opportunities in a creative manner.
C3. Prospecting	C3.1. Exploration of the real possibilities of the development and implementation process of ideas within an immediate future team.
C4. Success orientation	C4.1. Enhancement of the participation of other professionals providing the necessary support to the development of the idea.
	C4.2. Creative design of a digital entrepreneurship plan and its updating, according to the ideas provided by the work team.
	C4.3. Estimate of the costs of the proposals made.
	C4.4. Design of inclusive and sustainable entrepreneurship proposals.
C5. Leadership	C5.1. Creation of online communication spaces for the involved individuals to contribute and assess new ideas.
	C5.2. Mobilization of human resources to make an idea become a product.
	C5.3. Management of decisions and strategies of development offered by users to persuade other teammates and determine new actions.
	C5.4. Communicating new actions to teammates/users and training them on interest areas, such as financial education and economy.
C6. Planning and management of digital identity	C6.1. Creation of digital identities according to their role to protect reputation and deal adequately with the data spread and disseminated online.
	C6.2. Assessment of the protection possibilities and projection of the professional digital identity in the entrepreneurship proposals established.
	C6.3. Establishment of a net label, both at a general and specific level addressed to the target population of the entrepreneur proposal.
C7. Initiative	C7.1. Setup of processes creating value.
	C7.2. Development and usage of digital channels and contents to enhance participation and collaboration of different agents.
	C7.3. Management of the different digital identities and the data provided by each one of them to facilitate negotiation and effective communication processes.
C8. Communication and collaboration	C8.1. Collaboration and teamwork to develop and implement the idea through different technologies.

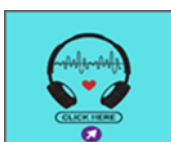| Indicators of the EmDigital model. **Sub-Competences**	**Indicators**
Table 31: Responses to the challenge of sustainable development	

Indicators of the EmDigital model. **Sub-Competences**	**Indicators**
	C8.2. Interaction between two or more people privately or publicly to discuss aspects related with the proposal through digital devices.
	C8.3. Sharing the information and the developed digital content with others.
	C8.4. Knowledge of virtual behavior rules to cover personal needs and attain goals in the most effective possible fashion.
C9. Creation of digital value	C9.1. Collection and management of materials and resources to create or update digital value in different formats (multimedia, texts, data, etc.) and available for several electronic devices.
	C9.2. Interaction with others to create, integrate and re-elaborate digital content.
C10. Responsibility and commitment	C10.1. Taking charge and committing with people (people, institutions) involved in the developed plan.
	C10.2. Authorship declaration of the published information and digital content and presentation of the licenses each product has online.
	C10.3. Application of an online behavior and interaction facilitating communication in favor of the attainment of social, cultural and/or economic goals.
C11. Learn from experience	C11.1. Error proofing and improvement proposals using digital tools to find new opportunities.
	C11.2. Being able to transform success and failure into a learning opportunity, control over frustration.
	C11.3. Improvement of digital entrepreneurship based on strategies to study its performance. An example would be the application of a key performance indicator.
C12. Problem solving	C12.1. Identification and solution of any kind of problem (technical, communicative, related with management, etc.) involved in the action.
	C12.2. Selection and usage of the most adequate resources to find solutions, implement them and assess them collaboratively.
	C12.3. Programming (planning and development of instructions sequences) to solve problems occurring before or during the process.
C13. Planning and organization	C13.1. Monitoring of compliance with the programmed updates within the estimated deadlines.
	C13.2. Management of the data and information gathered.
	C13.3. Effective and quick action against unexpected events happening during the development and implementation process of an idea.
	C14.1. Pro-environmental commitment and reduction of the impact the proposal might have on the environment.

Indicators of the EmDigital model. **Sub-Competences**	**Indicators**
C14. Techno-ethical approach	C14.2. Development of improvements for the implemented proposal to be always updated.
	C14.3. Development of an online identity supported by ethical and responsible criteria.
	C14.4. Attention to basic online safety aspects and guaranteed confidentiality of the entrepreneurship proposals implemented.
	C14.5. Attention to basic aspects of participants' privacy.
C15. Motivation and perseverance	C15.1. Perseverance on deficiency identification and ability to set innovative and digital proposals to overcome them.
	C15.2. Self-trust and motivation to offer the most adequate technological responses.

Table 31: Responses to the challenge of sustainable development

Figure 28, Source: Pixabay at pexels
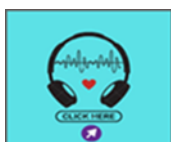
21. SUMMARY: How to Learn Sustainable Hospitality Digitally and Advance Digital Skills

The notion that sustainability is only relevant to some areas of digitalization is imprecise. **"There is very little digitalisation that does not contribute to either digital sustainability or digital unsustainability."** CybercomGroup. (2023).

The topic of learning sustainable hospitality digitally is a complex and interdisciplinary discipline. That is why it requires the ability to have an overview of several fields and the ability to combine factors and ingredients from each part. It also takes an innovative mindset that accepts that making mistakes and experiencing setbacks are part of the development journey.

The interdisciplinary shape of the field is very much in line with the focus of the UN:

"We live in an increasingly connected and interdependent world with digital advances transforming how we inform ourselves, transforming our behaviour, and encouraging innovation. We need not only new tools but also new capacities and ways of thinking. So across the United Nations family we are designing innovative projects, initiatives and partnerships." Pololikashvili, Z. (2018).

The connection between sustainability, digitalization and hospitality was highlighted in 2018 by The United Nations.

This interdisciplinary of sustainable digitalization in hospitality as an academic and practical field is quite new and also quite complex as we can argue that a lot of digitalization takes place without a sustainable purpose. However, this new and rising field does make sense from a tourism and hospitality perspective.

"The sheer size of global tourism and its impact on many other sectors, and all of the Sustainable Development Goals, puts it at the forefront of social responsibility, which today goes hand-in-hand with innovation on all levels. Harnessing innovation and digital advances provides tourism with opportunities to improve inclusiveness, local community empowerment and efficient resource management, amongst other objectives within the wider sustainable development agenda. The digital transformation is about providing benefits to all, and we are making sure that tourism contributes to this global commitment." (Pololikashvili, Z., 2018).

On one hand, we have digitalization as a proven tool and on the other hand we have sustainability as a proven need for hospitality as a sector and for all the sectors related to and dependent on hospitality:

"The wide reach of tourism into many sectors, from infrastructure and energy to transport and sanitation, and its huge impact on job creation, make it a vital contributor to the 2030 Agenda for Sustainable Development. Digital technologies
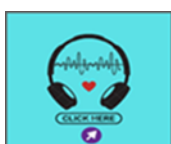
have brought positive momentum to societies and economies around the world. They have connected us on a global level, helped to empower the most vulnerable and become our crucial allies for sustainable development. Our challenge is to continue harnessing this power for good while safeguarding against the risks." (Gutierres, A., 2018).

The hospitality sector faces a reconstruction in the aftermaths of Covid and this project could offer a sustainable and digital way forward for the industry and in this way re-position the hospitality sector post-Covid-19. Making the hospitality sector more digitalized in a sustainable way can reposition the sector into a stronger and more valuable and competitive position post-Covid.

If digital hospitality is a new phenomenon, and not old wine in new bottles, it means that we need to abandon old ways of understanding hospitality and embrace new ways of understanding the field. This innovative and imaginative way of conceptualizing sustainable digitalization in hospitality embraces new ways of understanding the field and new ways of working with sustainable digitalization in practice. In line with the holistic and interdisciplinary nature of the project, it would make sense to have a broad and inclusive working definition of sustainable digitalization. That is why it can be argued that a critical, inclusive and ethical definition of sustainability must be a good fit to the project and UN's goals: An inclusive definition of sustainability is a definition that focuses on being green and on the human being in the process. What is sustainable for the organisation is not always sustainable for the individual employee and what is sustainable for one organisation is not always sustainable for other orgsanisation. Sustainable digitalization is an innovative process with many barriers, challenges and implications. Also, it is a discipline with many built-in traps such as short-cuts that can lead to greenwashing issues and misunderstandings. That is why it must be key to embrace the competence of critical thinking in the process of exploring and working with sustainable digitalization.

22. How to Infuse Digitalisation in Hospitality Working Environments

The metaphor of infusion, on the other hand, describes the process of a desirable essence permeating and transforming the milieu in which the system operates.

When infusion refers to the process of dissolving flavours from plant material, an infusion is also the name for the resultant liquid or solution. In this sense, infusion is a strategy for ESD integration that is deeper than embedding and is an ultimate solution. (UNESCO MGIEP, 2017, p.18).

Notwithstanding the importance of getting the technology selection right, there is also a need to upgrade people skills in the use of new technologies and assess whether processes need to be smoothed or re-engineered to take advantage of technology innovations. (Wynn, M., Jones, P., 2022).

Jackson [2020] notes that "successful digital transformation depends on people effectively adopting new ways of working or interacting with your organization. This means your digital transformation strategy needs to go beyond just the technology to encompass the people and processes that will support it". Successful IT deployment requires a focus on process improvements and people competencies, as well as on the technology itself. (Wynn, M., Jones, P., 2022).

Camison [2000], in his study of the hotel business in the Valencia region of Spain, found that process change may go beyond routine improvements and involve process re-engineering for some companies, and a major change in business strategy in others. As regards the people dimension, the mindset of hotel leaders is critical to effecting a change in culture and the acquisition of the requisite skillsets through training and awareness programs. (Wynn, M., Jones, P., 2022).

Secondly, an over-concentration on digital transformation initiatives can constitute a significant risk that may threaten business operations. ra. 3) found that "less than 30% of digital transformations succeed", and one reason for this is that such projects often cut across existing strategies and fail to recognise the risks of doing so. A recent hotel technology report recently suggested that "hotels should break out their digital transformation into small, achievable efforts directly connected to a business outcome" and that "hotels must focus on one area of improvement at a time, rather than trying everything at once" [Hotel Tech Report, 2022] (p.3). (Wynn, M., Jones, P., 2022).
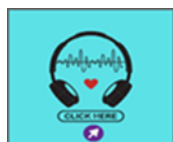
23. How to Measure Sustainable Hospitality Digitalisation

Digitalisation provides access to an integrated network of information that can benefit society and businesses. However, the evidence of sustainability in business is less researched.

The Sustainable Development Goals, which were introduced in 2015 as part of the United Nations 2030 Agenda, have the potential to help close the present gaps of digitalisation if the underlying issues are addressed. The idea of data-driven governance introduced in the 2030 Agenda for Sustainable Development emphasizes the need to "increase significantly the availability of high-quality, timely, reliable and disaggregated data by 2030". Digital transformation is described as "the profound transformation of business and organizational activities, processes, competencies, and models in a strategic and prioritized way, with present and future shifts in mind, to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across industries." (ElMassah, S.; Mohieldin, M., 2020).

By using a regression model, the authors identified ties. The study shows the ties between such indicators:

- ICT-based quality education (SDG 4) and ICT-based employment (SDG 8);

- ICT-based gender equality (SDG 5) with ICT-based employment (SDG 8) and ICTbased spending on R&D (SDG 9);

- ICT-based employment (SDG 8) has a link with ICT-based quality education (SDG 4)

and ICT-based gender equality (SDG 5);

- ICT-based spending on R&D (SDG 9) has a link with ICT-based responsible consumption (SDG 12) and ICT-based gender equality (SDG 5);

- ICT-based responsible consumption (SDG 12) and ICT-based spending on R&D (SDG 9). (Burinskienė, A., Seržante, M., 2022).

According to the findings of the study, digitalisation has a link with employment rates through education and gender equality; education is dependent on R&D spending, and gender equality is also dependent on R&D spending; R&D spending is also strongly linked to responsible consumption and vice versa; and responsible consumption is strongly linked to R&D spending. All of these connections are formed as a result of the use of information and communication technology. The results that have been presented have practical significance.

The study could be repeated by revising links to the country level and on an extended time interval level. (Burinskienė, A., Seržante, M., 2022).
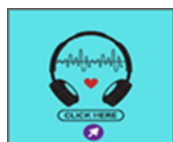
23. Measuring Sustainability

"If perfect measures of performance do not exist, organizations use proxies – indicators that approximate or represent performance in the absence of perfect measures" (Gray et al. 2015, p19)

Figure 29, Source: Martin Péchy at pexels.com 1

Measurement is not simply a technical undertaking, but it has significant behavioural implications, from extremely positive to incredibly negative. (Gray et al. 2015, 20)

"Often the current evaluation literature and management practice assume the existence of a social world external to the evaluator, which can be accessed and measured. This is crucial to shed light on because it can lead to a naïve and one-sided empiricism in which measures tend to be pereived as true representations of reality. However, when we try to measure perceptions, attitudes, and engagement, the process involves subjective interpretation and observation." (Buhman & Likely, p.12).

According to Buhman & Likely (p.12) some "healthy skepticism" is needed when dealing with measurement and evaluation and it is worth considering how to give stronger emphasis to the qualitative and interpretative approaches currently underrepresented in evaluation.

25. Measuring Sustainable Hospitality

There is a popular saying that only what gets measured gets done or gets managed. It means that measurement and evaluation increasingly become a fundamental and mandatory part of projects and that often having a good measurement method is a gateway to having new projects ideas approved. That is why establishing measurement methods and standards that the hospitality sector can agree on is crucial. Otherwise, the popular saying will mean that sustainable hospitality will not get done or get managed. (Heal, G., 2012).

Geoffrey Heal stresses that applying one of the usual measures of economic performance—gross domestic product (GDP), unemployment, inflation—can be misleading. "For example, some parts of India are running out of water, and the water table is falling. Farmers have to drill deeper wells to find water, using more labor and energy. But because this extra spending raises GDP, water shortages appear to be raising Indias GDP and making the country better off." (Heal, G., 2012).

One measurement model is the Human Development Index (HDI) that measures the well-being of members of a society – it is based on data in three welfare areas—health, education, and income. The model does not address environmental sustainability directly but takes a broader societal and regenerative approach and could possibly be combined with other sustainable dimensions.

Figure 30, Source: dcbel at pexels.com
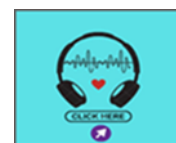
26. Measuring Digitalisation of Hospitality

"The concept of digital sustainability originated in the 2000s, which was advocated by Bradley as a way to achieve sustainable development from the perspective of digital artefacts and archives. As proposed by the United Nations (p. 37), sustainable development refers to the 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Wut, T.M. et al, 2021).

According to Wut's research paper, there is still a research gap when it comes to researching how to measure digitalization of hospitality. (Wut, T.M.; Lee, D.; Ip, W.M.; Lee, S.W. Digital Sustainability in the Organization: Scale Development and Validation. Sustainability 2021, 13, 3530. https:// doi.org/10.3390/su13063530). "Although digital sustainability presents a great opportunity to advance the sustainable development of organizations, prior research on measuring digital sustainability and related empirical models is limited. The absence of a scale to measure digital sustainability has also limited the possibility to empirically examine digital sustainability and its associated antecedents and consequences in organizations." (Wut, T.M. et al, 2021).

Covid-19 has hit especially hospitality very hard. However, this crisis and new normal have taught the industry and hospitality students to work online via work conference software like Google Meet, Teams, Zoom, Skype etc. and the digital technologies have offered a way to survive during the pandemic and a way to grow in the aftermath of the pandemic.

Wut proposes a broad and also a narrow definition of digital hospitality:

Wut's simple definition suggests that "digital sustainability is the sustainable use of digital resources". However, a broader way of understanding the field could be to see digital hospitality as 'organizational activities that seek to advance the sustainable development goals through creative deployment of technologies that create, use, transmit, or source electronic data". (Wut, T.M. et al, 2021).

In line with the simple, narrow definition, it can be helpful to understand sustainable digitalization as an economic investment in the future of the organization. Digital hospitality can be categorized into four major themes - content production, enabling technology, content preservation, and promotion of digital sustainability within the organization. (Wut, T.M. et al, 2021).

Since the practice of digital sustainability varies from company to company, researchers have been searching for a shared way to measure and evaluate it. With this contextual variety in mind, Wut et al. propose a measurement model his
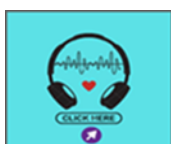
study develops a scale of digital sustainability metrics, which is based on a comprehensive literature review and provides a tool for corporate management "to sense the acceptance and hurdles towards digital sustainability amongst employees in an organisation in the areas of content production, preservation, promotion and technological enablers." (Wut, T.M. et al, 2021).

The scale consist of four parts –

> *content,*
> *preservation,*
> *promotion,*
> *technology. (CybercomGroup, 2023).*

The scale consist of four parts – content, preservation, promotion, technology. **"Digitalisation makes it easier to calculate and visualise whether the consumption is sustainable, based on various assumptions, such as equity, room for other species, pollution and overconsumption of natural resources."** CybercomGroup. (2023).

Figure 31, Source: Anna Nekrashevich at pexels.com
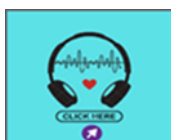
27. Measuring Digitalisation of Sustainable Hospitality

Digitalisation plays a role in the increasing consumerism trend in which many companies push people to buy more than they really want, to grow sales and profit, often with a negative impact on the planet. (CybercomGroup, 2023).

"There is evidence that treating citizens as merely consumers whose happiness depends on the consumption of products is contributing to an increase in mental illness." We need a dose of heathy realism when working with digitalization of sustainable hospitality because it both offers a driver for more consumerism and a driver for more sustainable consumption and hospitality society based on collaboration and sharing. It can be argued that digital sustainability should be seen as more than a traditional sustainability concept that is often materialized as an add-on to existing practices, instead it should be applied to fundamentally re-imagine organisation, business models and market functions.

"Digitalisation be a very powerful and disruptive catalyst that can help accelerate different trends. There is nothing inherently sustainable in digitalisation: indeed, a lot of digitalisation today is done for the purpose of only marginally improving unsustainable systems, and actually accelerates unsustainable lifestyles and values". (CybercomGroup, 2023).

"Much current digitalisation is incremental, or linear, meaning that it focuses on improving the efficiency of current systems. If those systems are contributing to sustainability, then digitalisation in that context also contributes to sustainability. However, incremental work should be assumed to be unsustainable; it should not be assumed, as it often is, to be sustainable or neutral." (CybercomGroup, 2023).

28. Indicators of Sustainable Hospitality

The purpose of setting indicators is to obtain data or knowledge about how the hospitality company, a division, a product or project is performing or doing in relation to the expectations, goals or plans such as average hotel occupancy. Indicators are not limited to financial departments of the hospitality organisation but can be used in any department or discipline both front stage and back stage as long as the department or project has measurable outcomes and operate in a way in which it input and output can be isolated in a way that makes the indication result credible and relatively precise. (Brown, T., 2021).

So the use of indicators allow hospitality actors to learn from their actions and to see which of their investments in sustainable hospitality that pays off the most. Indicators also support the motivation of the professionals because it allows them to follow the process. An example could be times like 2022 when the industry suffer from high energy prices. During these times, it is valuable to have real time indicators of energy prices in order to adjust daily operations to fit when the energy prices are low during the day and night. Fortunately, the hospitality industry such as hotels and restaurants have a tradition for working with indicators such as online reviews, RevPar, RevPas and ALOS (Average length of stay). Unfortunately, sustainable hospitality practices are more complex to measure and evaluate as processes cannot always be isolated from other parts and disciplines. With an increasing amount of data available from increased digitalization of hospitality, it becomes more and more important to not only have indicators but have the right and most intelligent metrics.

The increased amount if data and possible indicators possess a huge opportunity. However, it can also lead to confusion. According to the research paper titled Identifying Core Indicators of Sustainable Tourism by Agyeiwaah, "Progress towards a more sustainable tourism sector at an enterprise level has been slow, even though a number of studies have developed a variety of indicators. Indeed, so many indicators have been developed that industry seems to be overwhelmed by choice, leading to inaction, poor decision-making or adoption of the easiest option." (Agyeiwaah, E., Mckercher, B., Suntikul, W., 2017).

The paper also argues that it must be considered whether each company must decide and develop its own indicators depending on the site, the context and the enterprise specific. The paper suggest a number of indicators such as waste management, job creation, maintenance of community integrity and quality of life.
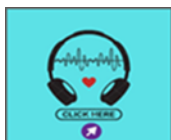
According to the 2022-systematic literature review of sustainability indicators in hotels by Reem et al., little is known about green indicators governing the sustainable practices of the global hotel industry. (Reem,M., 2022).

However, the study found no less than 356 hotel sustainability indicators such as certifications, badges, education, energy audits, occupancy rate, consumption costs per bed, average waste per portion, serving waste, number of portions for each meal, number of guests, design if building and infrastructure, show-up indicator, reuse indicator, portion size indicator, area of pool per bed. (Source: https://fslmjournals.taylors.edu.my/wp-content/uploads/APJIHT/APJIHT-2022-11-1/APJIHT-111_P7.pdf)

29. Indicators of Digitalisation and Indicators of Sustainable Hospitality Digitalisation

In the business of hospitality, many of our current regulations and structures focus on economic growth, neglecting sustainability and regenerative considerations. Therefore, digitalisation often accelerates unsustainability. Moreover, digitalization brings along new challenges such as privacy, cyber security, cyber bullying. At the same time as encouraging digital sustainability, we also need to discourage digital unsustainability." (CybercomGroup, 2023).

The Digital Sustainability Report by Cybercom points out that there are two different indicators of hospitality digitalization:

1. The traditional approach in which e.g. a solar panel supplier reports only on the impact of the production of the production and the impacts from the usage of the products.

2. The net-positive approach in which the solar panel supplier would also indicate the effect on the market and the consumption that the products have e.g. the products propel the drive towards making it easier to switch to electric cars.

While, it makes it harder to indicate and measure precisely the broader net-positive approach, it is important to emphasize a focus on the significant indirect impacts by delivering solutions in hospitality-supplying industries such as the hotel construction industry that can build smart buildings that produce more renewable energy than they use and can be shared easier with local community stakeholders. Well-known sustainability indicators, such as CSR

reporting standards, labelling, rankings and procurement criteria do not fit well with the new generation of solution providers. (CybercomGroup, 2023).

The solution providers are those companies that try to approach digital sustainability from a positive perspective, and it represents a shift from minimizing negative outputs to aiming to increase positive outputs through the core business. The solution-perspective argues that if companies were only expected to reduce their own emissions, sometime the output of sustainable solutions would suffer. (CybercomGroup, 2023).

"Business, cities and states should be encouraged to report, not only their own emissions, but also their contribution to reductions in other parts of the economy. This would allow for climate-positive reporting and catalyze action among companies that have solutions that can help reduce GHG emissions significantly, but are not big emitters (such as many IT and biotech companies). (CybercomGroup, 2023).
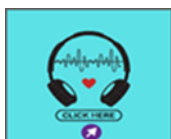
30. Relevance to GRI (Global Reporting Indicators and other metrics)

The global standards for sustainability impacts

30.1. GLOBAL REPORTING INITIATIVE STANDARDS
The global standards for sustainability impacts

The GRI Standards enable any organization – large or small, private or public – to understand and report on their impacts on the economy, environment and people in a comparable and credible way, thereby increasing transparency on their contribution to sustainable development. In addition to companies, the Standards are highly relevant to many stakeholders - including investors, policymakers, capital markets, and civil society.

The Standards are designed as an easy-to-use modular set, delivering an inclusive picture of an organization's material topics, their related impacts, and how they are managed. (GRI, Global Reporting Initiative, 2023)

The Universal Standards - now revised to incorporate reporting on human rights and environmental due diligence, in line with intergovernmental expectations - apply to all organizations;

The new Sector Standards enable more consistent reporting on sector-specific impacts;

The Topic Standards - adapted to be used with the revised Universal Standards - list disclosures relevant to a particular topic.

The GRI Standards enable organizations to report information about the most significant impacts of their activities and business relationships on the economy, environment, and people, including impacts on their human rights. Such impacts are of primary importance to sustainable development and to organizations' stakeholders, and they are the focus of sustainability reporting.

The impacts of an organization's activities and business relationships on the economy, environment, and people can have negative and positive consequences for the organization itself. These consequences can be operational or reputational, and therefore in many cases financial. For example, an organization's high use of non-renewable energy contributes to climate change and could, at the same time, result in increased operating costs for the organization due to legislation that seeks to shift energy use toward renewable sources.

Even if not financially material at the time of reporting, most, if not all, of the impacts of an organization's activities and business relationships on the economy,
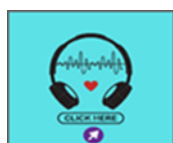
environment, and people will eventually become financially material issues. Therefore, the impacts are also important for those interested in the organization's financial performance and long-term success. Understanding these impacts is a necessary first step in determining related financially material issues for the organization.

Sustainability reporting is therefore crucial for financial and value creation reporting. Information made available through sustainability reporting provides input for identifying financial risks and opportunities related to the organization's impacts and for financial valuation. This, in turn, helps to make financial materiality judgments about what to recognize in financial statements.

GRI 1: Foundation 2021

GRI 2: General Disclosures 2021

GRI 3: Material Topics 2021

GRI 11: Oil and Gas Sector 2021

GRI 12: Coal Sector 2022

GRI 13: Agriculture Aquaculture and Fishing Sectors 2022

GRI 201: Economic Performance 2016

GRI 202: Market Presence 2016

GRI 203: Indirect Economic Impacts 2016

GRI 204: Procurement Practices 2016

GRI 205: Anti-corruption 2016

GRI 206: Anti-competitive Behavior 2016

GRI 207: Tax 2019

GRI 301: Materials 2016

GRI 302: Energy 2016

GRI 303: Water and Effluents 2018

GRI 304: Biodiversity 2016

GRI 305: Emissions 2016

GRI 306: Effluents and Waste 2016

GRI 306: Waste 2020

GRI 308: Supplier Environmental Assessment 2016

GRI 401: Employment 2016

GRI 402: Labor/Management Relations 2016
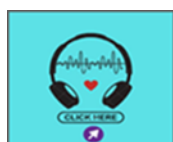
GRI 403: Occupational Health and Safety 2018

GRI 404: Training and Education 2016

GRI 405: Diversity and Equal Opportunity 2016

GRI 406: Non-discrimination 2016

GRI 407: Freedom of Association and Collective Bargaining 2016

GRI 408: Child Labor 2016

GRI 409: Forced or Compulsory Labor 2016

GRI 410: Security Practices 2016

GRI 411: Rights of Indigenous Peoples 2016

GRI 413: Local Communities 2016

GRI 414: Supplier Social Assessment 2016

GRI 415: Public Policy 2016

GRI 416: Customer Health and Safety 2016

GRI 417: Marketing and Labeling 2016

GRI 418: Customer Privacy 2016
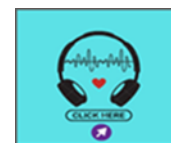
30.2. Sustainable Brand Index

Sustainable Brand Index™ is Europe's largest brand study on sustainability. The study measures the perception of stakeholders on a brand's sustainability across industries and countries.

Sustainable Brand Index™ yearly ranks brands on sustainability. The rankings show how brands are perceived on sustainability by their important stakeholders. Brands are selected independently based on market share, turnover and general brand awareness. Sustainable Brand Index™ is an independent study founded in 2011 consisting of nearly 1 600 brands, 36 industries, and 80 000 consumer interviews across Europe (the Nordics, the Netherlands & the Baltics). (Sustainable Brand Index, 2022).

30.3. Climate Action Index

Financial and investment firms can provide essential support and capital to the companies, technologies and business models that will help decarbonize the global

economy. The MSCI Climate Action Indexes expand MSCI's climate indexes range, offering investors a broader choice of solutions to help them meet their net-zero commitments and integrate climate considerations in global equity portfolios. The indexes are designed to help institutional investors seeking to invest for the transition and finance the emission reduction of companies in order to drive change in the real economy. The MSCI Climate Action Indexes use a new assessment of a company's net-zero target setting and climate risk management to select the top half companies in each GICS®1 sector.

The Indexes include companies in every sector that are taking concrete steps to reduce their carbon emissions and reimagine their businesses for a net-zero world. This range of global equity indexes is designed for institutional investors who seek a consistent framework for reducing carbon emissions by backing companies based on their readiness to lead the low-carbon transition compared with peers.

30.4. Global Destination Sustainability Index: the GDS-Index

The Global Destination Sustainability Index (GDS-Index) is a destination level programme that measures, benchmarks and improves the sustainability strategy and performance of tourism and events destinations.

Its purpose is to inspire, engage and enable destinations to become more regenerative, flourishing and resilient places to visit, meet in and thrive in.

Scope: Unlike other standards and rankings, the GDS-Index was specifically created – originally – for the events and meetings industry and is the only programme of its type in the world. Since 2020 we have integrated leisure tourism into the criteria, making it relevant for all leisure and business tourism destinations.

Origins: The GDS-Index was created in 2015 by fifteen visionary Scandinavian Cities, MCI and the International Congress and Convention Association (ICCA). (GDSM 2020).
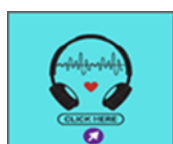
31. TWIN TRANSITION: How to merge green skills and digitalisation skills effectively for increasing sustainability of hospitality

The twin green & digital transition: How sustainable digital technologies could enable a carbon-neutral EU by 2050. (European Commission, 2022).

The relationship between the two transitions

Ideally, the green and digital transitions reinforce each other. For example, distributed ledger technology, which underlies blockchain and thus cryptocurrencies, can be used in material tracing, aiding the circular economy by better maintenance and recycling. (European Commission, 2022).

And Digital Twins, virtual counterparts of the real world, can model, among others, traffic, to optimise traffic flows, reduce jams and slash emissions in the process.

However, sometimes the two transitions can also clash. Digitalisation uses electricity, and many digital technologies are resource-intensive and create waste. Unintended consequences can crop up, such as owners of hybrid cars driving more because it is cheaper. Teleworking would cut office space but could lead to employees building separate working rooms at home, and heating or cooling more space than if they were in the office. (European Commission, 2022).

To make the most out of the twin transition, proactive and integrative management will be needed. The digital transition will be spearheaded mainly by the private sector due to its huge economic potential. To harness its benefits for greening and to limit its harmful effects, state and civil society engagement will be necessary. (European Commission, 2022).

Requirements for having successful green & digital transitions

The authors listed a set of requirements to show under which conditions this engagement can be successful. **These are social, technological, environmental, economic, and political in nature**. (European Commission, 2022).

One requirement is to increase the societal commitment to the need to change to achieve the transitions. This cannot be enforced top-down, the researchers warn. Making the twin transition fair and inclusive can make its acceptance easier. Not everyone is in a position to buy costly rooftop solar panels, but subsidies for it are provided by all taxpayers. Making such technology affordable to everyone is key to a just and effective transition. (European Commission, 2022).

More data also means more privacy concerns. These must be addressed by anonymising data collection and data minimisation, gathering only as much data as strictly necessary. (European Commission, 2022).
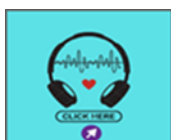
Another set of requirements is technological. The needed infrastructure environment has to be put in place, beginning with high-speed broadband internet access for all. Interoperability between devices must be ensured, and benefits must be shared equally, with small and medium-sized enterprises included as much as large companies. (European Commission, 2022).

When it comes to the environmental requirements, awareness-raising and higher environmental standards could keep unintended consequences and rebound effects in check. (European Commission, 2022).

In economic terms, enabling markets are required to avoid getting stuck in an "innovation valley of death", when research gains fail to materialise in applied form. A regulatory eco-system should be created that sets high green standards and internalises external costs of pollution and emissions. Upskilling of the labour force is needed to fully exploit the potential of digital technologies. (European Commission, 2022).

Figure 32, Source: Connecting Flights Guide at pexels.com
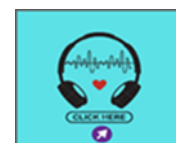
32. INTERNATIONAL PRACTICES of Sustainable Hospitality Digitalisation

The global tourism industry has benefited from three waves of technological change (Pease and Rowe, 2005; Shanker, 2008) which allowed CRS, GDS and use of the Internet to link business destinations and tourism companies. The evolution of the technology allowing the 4th industrial revolution is known as Industry 4.0 (Ivanović et al., 2017). (Zeqiri, A. Dahmani, M., Youssef, A. B., 2020). **The main challenges that hospitality industry is facing are mass tourism, creation of personalized services for consumers and sustainable development. The implementation of hospitality industry 4.0 technologies should help to resolve these challenges.** (Zeqiri, A. Dahmani, M., Youssef, A. B., 2020)

Hospitality industry 4.0 aims the creation of more personalized and digitalized services for consumers. It should reduce mass tourism and allow individualized experiences and sustainability (Ben Youssef and Zeqiri, 2020). **Smart hospitality involves an interoperable and interconnected system that enables information sharing and provides added value for the entire ecosystem of stakeholders via digital platforms (Buhalis and Amaranggana, 2015; Buhalis and Leung, 2018). Industry 4.0 has changed the consumer behaviour regarding the use of hospitality services.** According to Buhalis and Leung (2018), smart hospitality will put customers at the centre of the process by providing personalized and contextualized services and experiences and will allow the exchange of information along the value chain. Further, Ben Youssef and Zeqiri (2020) emphasize that **consumers will benefit from a digital environment that will allow them to engage in various activities using digital technologies. Consumers are no longer satisfied by provision of essential facilities and the hospitality sector must change to meet their expectations.** (Zeqiri, A. Dahmani, M., Youssef, A. B., 2020)

Usage of various technologies in hospitality is not only as tool to improve, boost effectiveness and efficiency, but also is part of costumer experience creation process and improves overall enterprise performance. (Buhalis, Leung 2018).The world we are living now is undergoing the fourth industrial revolution – era when technologies like artificial intelligence, robotics, the Internet of things, fifth-generation wireless technology and virtual reality conquers world. (Zhu, Wang & Cheng, 2021)

In hospitality robots are used in various ways like chatbots which allows a hotel, restaurant or travel agency to ensure that support and assistance is available 24/7. Process is automated and saves resources, delivering better customer experience in timely manner. (Revfine, 2023) In Nagasaki, Japan Henn-na Hotel became the first hotel which is staffed by robots. Robots provide services like front
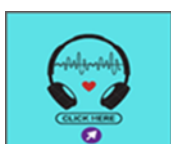
desk operations, check-in and check-out, porter robots for carrying luggage and even facial recognition to open room door. (Henn-na Hotel, 2023)

Over the past few years, virtual reality (VR) apps have grown in popularity, which has affected the hospitality industry. Once it comes to the intangible aspects of the hospitality experience, virtual reality can significantly influence a customer's booking decision. Customers can get a much clearer idea of what they are anticipating thanks to the digitally enabled environment, enticing more potential customers. The virtual tour video, which gives visitors a first-person perspective of the property, is one example of a VR application. Visitors can get a digital walkthrough with a 360-degree view and even see the layout of the rooms in a hotel by simply clicking the mouse or donning a headset. (Zhu, Wang & Cheng, 2021)

Figure 33, Source: pexels-harsch-shivam-2007647

Largest Hotel chains like Marriott International, Hilton, Radisson Hotel Group have implemented technologies in their daily operations like mobile check-ins, check-outs, mobile chats, mobile keys. In some hotels it is also possible to control air conditioning, lights, etc via mobile phone. Usage of IoT gives chance for hospitality industry to provide more personalized and customized service. Collecting data for guest preferences helps to deliver the same service for future stays and it helps to build guests loyalty to particular brand.

Ben Youssef and Zeqiri (2020) argue that CPS, the IoT, AR, VR, AI and robotics and big data are aspects of industry 4.0 that will affect the hospitality industry. The interconnection of Industry 4.0 technologies can be achieved through the use of horizontal, vertical and end-to-end system integration tools along the value chain (Ben Youssef, 2020). (Zeqiri, A. Dahmani, M., Youssef, A. B., 2020).
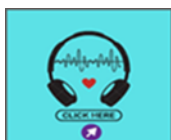
Table 32: Main pillars of hospitality industry 4.0 (Zeqiri, A. Dahmani, M., Youssef, A. B., 2020).

Table 32: Main pillars of hospitality industry 4.0			
Authors	Pillar	Description of the technology	The technology in hospitality industry
(Lee et al., 2015)	CPS	CPS are defined as integrated and interconnected physical And virtual arrangements based on computation, communication, and control systems.	CPS consists of two aspects: first, interconnection of the physical and cyber worlds which enables access to the real-time data; second, smart data management, analytics and computational capability.
(Munir et al., 2017); (Kansakar et al., 2019)	IoT	IoT involves interconnectivity among physical devices and cyber worlds.	IoT enables interactions with tourists and collection of real time tourist data, thus creating personalized and localized services, and accurate evaluation of tourists' behaviors and preferences.
(van Krevelen And Poelman, 2010); (Kounavis et al., 2012)	AR	AR involves the combination of real and virtual objects in a real environment, synchronization of real and virtual objects, and interaction in 3D and real time.	AR provides tourists with more personalized services and several additional benefits. It enables tourists to share and exchange information and opinions with other tourists in large networks.
(Desai et al., 2014); (Wiltshier and Clarke, 2016).	VR	VR simulates reality. VR is "a computer simulated (3D) environment that gives the user the experience of being present in that environment".	VR provides people with opportunities for virtual travel with a low cost and contributes to sustainable tourism.
(Ben Youssef and Zeqiri, 2020); (Buhalis and Leung, 2018)	Big data	Big data analytics are related to recent technological developments, which cope with the data	In the hospitality sector, big data include internal and external big data. Data can be classified based on their characteristics and type, and hospitality ecosystem actors can access and use

		processing and analysis.	these data to prepare strategic business plans and manage their operations in a dynamic way
(Tung and Law, 2017); (Horváth and Szabó, 2019); (Ben Youssef and Zeqiri, 2020)	AI and robots	AI and robots are used in workplaces to maintain contact with people in a shared non-industrial environment and can replace humans in R&D activities.	AI and robots are used in the hospitality sector to create more personalized and unique experiences, for instance at traveler information centres in the airport.

Sustainability through specific digital technologies or functionalities

1 **ICT**: Information is the most discussed theme concerning functionalities. Most articles refer to it separately from 'communication', rather than using the combined acronym ICT. (Guandalini, I., 2022).

2 **Big data:** In the digital era, big data are the 'new oil' (ElMassah & Mohieldin, 2020). The selected literature mentions them in relation to two aspects, specifically their contribution to sustainability as well as to sustainable IoT. With regards to the first, according to Seele (2016b), by enhancing communication and transparency, big data can trigger and monitor sustainability on large scale. In addition, big data enable stakeholders to rigorously observe and compare sustainability performance. Focusing on business to business, Sivarajah et al. (2020) highlights the integrative role of big data and social media analytics to boost sustainability, particularly with specific functions such as marketing and operations. (Guandalini, I., 2022).

3 **Digital twin:** Highly discussed as specific technology in relation to sustainability is also the concept of digital twin. For instance, Allam and Jones (2021) discuss the role of digital twin in smart cities and urban development, explaining how such technology helps visualising and preparing for future sustainable cities. He et al. (2021) propose a data processing model for intelligent detection robotics aimed to the achievement of sustainable development goals. anufacturing (Lafferty, 2019, Plumpton, 2019, Seele, 2016). (Guandalini, I., 2022).
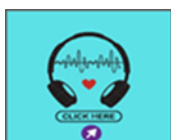
33. SUMMARY: What is sustainable hospitality digitalisation concept and process, how to learn and update knowledge and skills on sustainable hospitality digitalization

European Digital SME Alliance has defined that **sustainable digitalisation or sustainable digital transformation is the process of digitalising the economy in a long lasting, green and organic way. (**Digital SME, 2023) Hospitality industry nowadays goes hand in hand together with technologies and should adapt to the newest trends rapidly. "**Digitalisation** enables the realization of the resilient infrastructure in every application for achieving sustainability.… Digital technology has already proved to enhance hospitality services with intelligent decisions through real-time data." (Narayan et. al., 2022)

Digital transformation uses a variety of information, computer, communication, and connection technologies to strengthen an entity by bringing about major changes to its features. Digital technologies with the potential to alter how hospitality industry manage their operations and value chains including IoT, AI, robotics, blockchain, big data analytics, digital twins, and AR/VR. These technologies can be applied by hospitality industry to manage organizational resources and capacity as well as their service, customer relations, order process, competitiveness, service quality, flexibility, resource consumption, and innovation. (Vial, 2021)

More than ever before **digital skills** are important part of sustainable hospitality digitalisation. Digital fluency and the ability to interpret data, including data generated by customers through online marketing, branding, and distribution, as well as data collection, data management, and data analytics, are increasingly important as the demand for one-of-a-kind, customized, and personalized tourism experiences rise. Numerous types of individualized, customer-focused interactions, experiences, and services are made possible by data analytics and the procedure for collecting and analysing vast amounts of online customer data. (Carlisle et. al., 2021) It is essential to have the ability to create experiences using AR, VR, mixed reality, and other technologies. Augmented reality and mixed reality, that also integrate virtual objects in real-world environments and empower interaction with them, have the potential to make travel easier, more convenient, more educational, and safer by enhancing the experience rather than replacing it, in contrast to virtual reality (VR), which generally removes users from their surroundings and immerses them in 3D environments. This means that (AI-powered) augmented reality mobile apps are currently revolutionizing, facilitating,
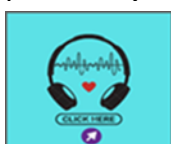
and enlivening the processes of accessing information and tour guiding. Hotels can integrate AR in many creative ways to inform their customers about local attractions, local transportation options, restaurant choices, and other options via reception-less check-in at tablet-based kiosks. Furthermore, it is more essential to strengthen professional abilities in cybersecurity, privacy, and online safety. (Garcia and Ruiz, 2020)

Figure 34, Source: pexels-markus-spiske-2559749 1

34. Suggested Learning Styles

People disagree on how many styles exist. For example, Neil Fleming, a New Zealand teacher, in 1987 established his popular VARK model, which includes:

- Visual learners
- Auditory learners
- Reading/Writing learners
- Kinesthetic (physical) Learners

Human behavior specialist Scott Black took Harvard professor Howard Gardner's research and put it into practical use, creating one of the first measurable and predictable ways of determining a person's overall learning style. The process starts with your fingerprints, amazingly enough. Within 24 to 48 hours, Black can produce a 36-page report that identifies eight different intellects and how you personally process visual, auditory and kinesthetic information. Verma, E. (2023).

Here are **eight learning styles** as proposed by some scholars when different words are used (the sequence can vary):

Table 33: Eight learning styles

	Learning Style	Explanation
1	The Linguistic Learner or Verbal Learners (aka Linguistic Learners)	The linguistic learner is one who learns best through linguistic skills including reading, writing, listening, or speaking. (Verma, E, 2023).
2	The Naturalist or Natural/ Nature Learners	he naturalist learns by working with, and experiencing, nature.If this sounds a lot like a scientist, it's because that's how scientists learn. The naturalist loves experiences, loves observing the world around them, and captures the best information or knowledge through experimentation. (Verma, E, 2023).
3	The Musical or Rhythmic Learner or Aural (audio) Learners	The musical or rhythmic learner is one who learns using melody or rhythm. This would be like a musician learning how to play by listening to a piece of music or a drummer who hears beats in his head and on the street from arbitrary sources before putting it together in the studio. But it can also be a person who learns best while humming, whistling, toe-tapping, tapping their pencil on the desk, wiggling, or listening to music in the background. For this person, music isn't a distraction but instead actually helps the learning process. (Verma, E, 2023).
4	The Kinesthetic Learner or Physical (tactile) Learners	The Kinesthetic learner is a person that learns best by actually doing something. These people are also scientific in nature and must interact with objects in order to learn about them (or

		learn about them in the best way possible). (Verma, E, 2023).
5	The Visual or Spatial Learner or Visual (spatial) Learners	A visual or spatial learner is a person who learns best if there are visual aids around to guide the learning process. For example, someone who can learn best from diagrams, pictures, graphs would be a visual or spatial learner. These people tend to be technically-oriented and enter engineering fields. An example of this type of learner would be a person who becomes a computer engineer or programmer. But, the best students are those that are visual or spatial learners. Why? **Because being proficient in programming and IT requires that you be a strong visual or spatial learner.** **Almost everything having to do with computers is conceptual and so it relies on graphical or visual representations of components that can't actually be seen (e.g. bytes). (Verma, E, 2023).**
6	The Logical or Mathematical Learner or Logical (analytical) Learners	The logical or mathematical learner must classify or categorize things. They also tend to understand relationships or patterns, numbers and equations, better than others. **These are obviously engineers, scientists, mathematicians, and other technical professions. (Verma, E, 2023).**
7	The Interpersonal Learner or Social Learners (aka Linguistic Learners)	The interpersonal learner is someone who learns by relating to others. Often, these people share stories, work best in teams, and compare their ideas to the ideas of others. In a sense, others help them think of new ideas of their own. They are often naturally good leaders as well as team players. You often see these people in various fields of psychology or social sciences. (Verma, E, 2023).
8	The Intrapersonal Learner or Solo Learners	The intrapersonal, as opposed to interpersonal, learner is someone who works and learns best when they are alone. They set individual goals that are challenging, but not impossible. They are also motivated by internal forces, rather than external ones. They are often introverted individuals, but not always. **These people often enter creative fields, become entrepreneurs, and sometimes small business owners. But, they are usually in fields or industries that allow them to work without direct supervision. (Verma, E, 2023).**
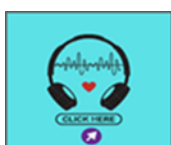
35. The study how the companies are dealing with digitalisation and what are their sustainable hospitality practices

In this chapter we will present some of the current and future trends when it comes to the digitalization and sustainability efforts of the hospitality sector in general. The aim is to give you – the reader – practical insights into the various trends and developments that have occurred - especially in the wake of the Covid19 pandemic.

In the first part of the chapter, we will focus on the digitalization and sustainable practices of the hospitality sector. This will present the reader with a full view of the how hospitality companies are dealing with the digitalization challenges and sustainability practices and how the Covid19 pandemic in many ways has been an accelerator for both.

Subsequently in the second part of the chapter, our focus will be on specific current and future technologies in the hospitality sector. We will specifically focus on the following technologies and how they contribute to the digitalization of the hospitality sector:

- Guest-facing systems

- In-room IoT sensors

- Hospitality services, body area sensors

- Energy management

- Building automation and monitoring

- Augmented reality

- Beacon technology

Finally, in this chapter, we will address some of the challenges facing hospitality companies when working with digitalization such as

- Interoperability,

- Data Management,

- Security and Privacy
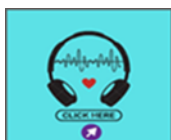
36. Sustainable hospitality digitalisation industry field workshops and working environment

Digitalization is an inevitable part of the strategic mindset of most hospitality companies. Whether you are a multi-billion Dollars hotel chain, or a local bed and breakfast, digital skill are an essential part of your business model. This must however be view through the prism of the both the needs of the company - and just as importantly – the demands of the guests. In many ways this will help determine the scope of digitalization and the need for further digitalization efforts.

Just as important as the ever-increasing focus on digitalization is the need to address sustainable hospitality practices. How green to we need to be, and how much effort do we put into developing our business in a more sustainable way? Again, this is a balance between the needs of the company and the demands of the guests.

The above topics are going to be the focus of this sub-chapter. Both will be dealt with in the same way, where we initially look at the historical context of the topic in order to better understand the current situation which will be concluded with a view of future possibilities.

36.1. Digitalization practices

Digitalization practices

The current situation of digitalization in the hospitality sector

In many ways the development of digitalization within the hospitality sector is reflected by the general digital development in other business sectors, and in that regard, we are currently within what is know as the "fourth industrial revolution" (PWC, 2018) which we will deal with in detail later in this subchapter. In order to understand the latter however, we need to address the development of modern society throughout the past 150 year as illustrated by the model below with the 3 previous "revolutions" and how especially the 3 parts of the revolutions helped to shape digital efforts of hospitality companies
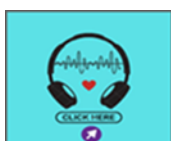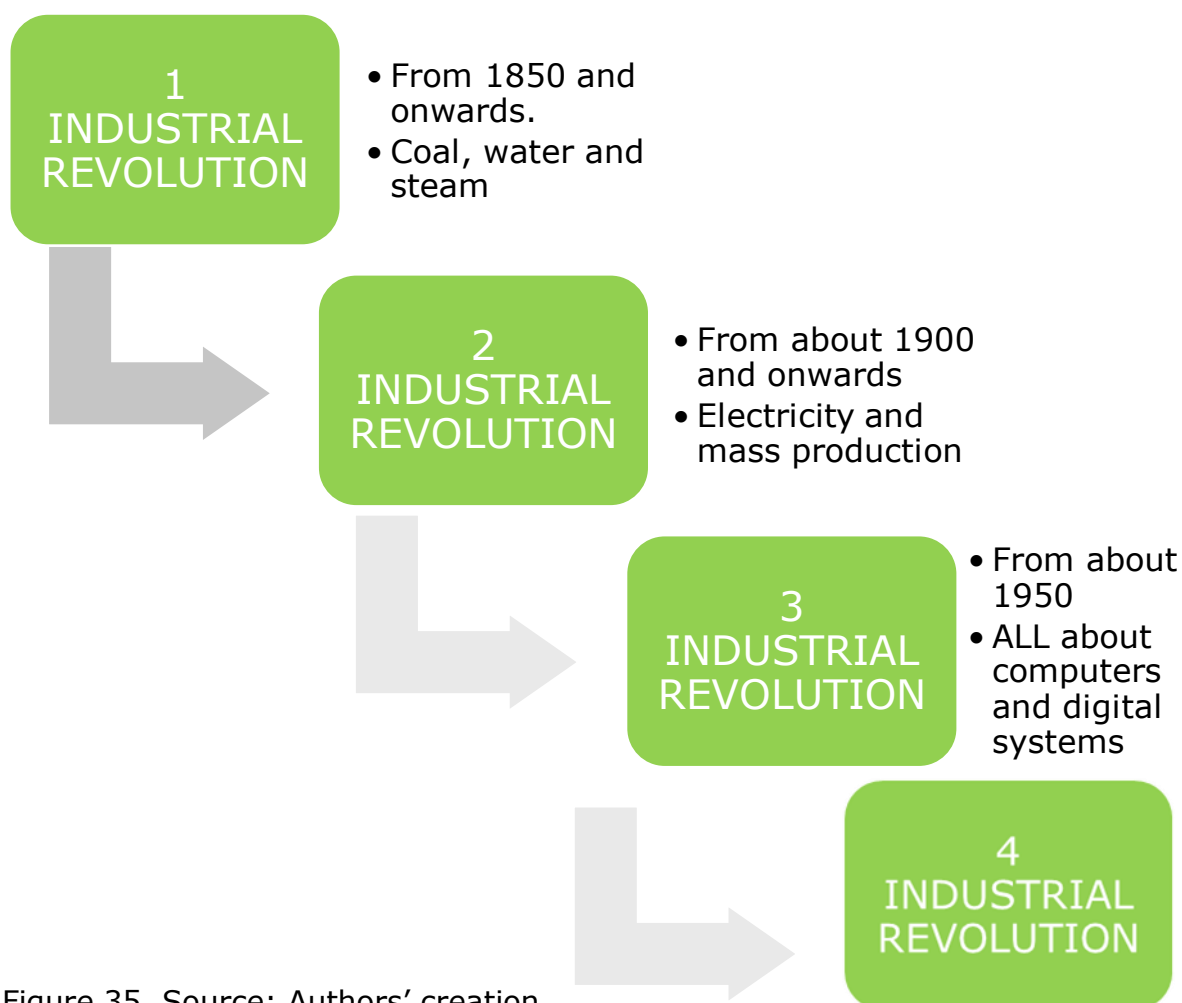
Figure 35, Source: Authors' creation

Revolutions 1 and 2

During the 1 industrial revolution we went from a predominantly agricultural society where the majority of the people mainly lived in the countryside as their forefathers had done. The traditional occupation was, and had been for the previous 1000 years, farming which occupied the vast majority of the working force. In the middle of the 1800 technological innovations however brought about a significant shift in both the way goods were manufactured and transported, but also where people lived. In short, the invention of steam engines through the utilization of coal and other raw materials made the tools of production significantly more effective. It also drove people to move from the countryside into the cities to find occupation in the burgeoning industrial sector.

In the immediate wake of the 1 revolution, the second one followed at the end of the 1800'ies with the introduction of electricity. This hailed an area of mass production and increased efficiency unseen before in human existence. As a consequence of the two revolutions from around 1850 – 1930 farming was no longer the predominant occupation as jobs were now created in the factories that grew in the wake of the 1 and 2 industrial revolution (PWC, 2018).
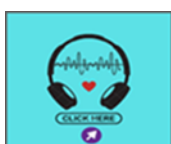
Revolution 3

The 3 industrial revolution took place from around the 1950'ies and hailed the coming of the digital era with the invention of the computer and digital tecnology. Initially, the evolution of digital technology in the early phase was slow and piecemeal, but this changed radically with the advert of the internet from the early 1990'ies which functioned as an accelerator for the development of digital innovations.

Revolution 4

And this bring us to the present day and the fourth industrial revolution in which companies are currently operating. The term itself was coined by the World Economic Forum in 2016, and it is seen by many as a much greater force for change and disruption than the previous 3 revolutions:

There are three reasons why today's transformations represent not merely a prolongation of the Third Industrial Revolution but rather the arrival of a Fourth and distinct one: velocity, scope, and systems impact. The speed of current breakthroughs has no historical precedent. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. Moreover, it is disrupting almost every industry in every country. And the breadth and depth of these changes herald the transformation of entire systems of production, management, and governance. (WEF, 2016)

In essence the fourth industrial revolution is about the merging of man and machine. And no, we are not talking about a "Terminator" scenario with Arnold Schwarznegger in the lead role as a mean, lean killing machine in a post-apocalyptic future, where the machines have taken over control of mankind! Rather, it is an era where the interaction between technology and humans are more inseparable than previously and where artificial intelligence, cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies will affect the daily lives people all over the world. New technologies are constantly emerging, and our daily reliance on digital devices is increasing at a rapid pace. This has been further accelerated by the past two years of Covid19 and this will be covered in a separate chapter further on.
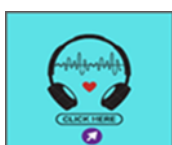
36.2. How has the different revolutions affected the hospitality sector?

As mentioned before, the hospitality sector cannot be separated from the general development in its surrounding environment and rather than being a force of change, the hospitality sector merely adapted it's offering to the needs arising from the changes happening around it. As a consequence of the first two revolutions more and more people went from the countryside to the bigger cities, and hotels went along. Instead of the small family run taverns in the countryside, larger hotels and resorts stated to appear to cater the growing need for accommodation.

Likewise, the industrial revolutions triggered the average income to rise steadily in especially western countries as they reaped the benefits of the technological advances, allowing for customers to spend larger sums on spare time entertainment. This was illustrated by the psychologist Abraham Mazlow and his pyramids of needs. Where consumers in the early stages of the industrial revolution were concerned with the basic needs (mainly safety and getting food in the table), they now gradually moved "up" the latter of the needs pyramid and were able to get other needs fulfilled – among these the need for pleasure and wellbeing. In most western societies from around the 1950'ies this meant that a substantial amount of households from the middle class were able to acquire washing machines, refrigerators and other technological appliances that previously only were meant for people with a high income. Additionally, this meant that the average middle class family now also had the disposable means to spend money on other luxuries such as traveling and other types of experiences, thus fueling the growth of companies within the hospitality sector from the 1950'ies and up.

This development was by no means a global phenomenon, as vast part of globe in the last part of the 20 century still lived in poverty and with no means to partake in the economic development described above. In for example most East European countries, where the level of technical and digital development did not occur at the same pace as in Western Europe and the USA, poverty was still very much a part of the everyday life and thus the opportunity to lavish money on luxuries such as travelling abroad was not feasible (and in several countries controlled by the Soviet Union not even allowed!)

36.3. How the Covid19 pandemic fueled the digital efforts of the hospitality sector

One of the predominant accelerators for introducing the fourth industrial revolution within the hospitality sector has without doubt been the Covid19
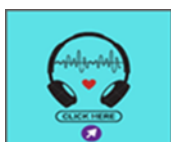
pandemic which in many ways forced the larger parts of industry to go digital to a degree not seen before (Zeqiri et al., n.d.). Rather than being a choice, it became a necessity for companies from all sectors in the hospitality sector to embrace new technologies in order to survive the ramifications of the pandemic (CBI, 2021). Also known as "the

Figure 36, Source: pexels-miguel-á-padriñán-3936421 1

great accelerator" of digitalization (Amankwah-Amoah et al., 2021) Covid19 has reshaped how companies from all sectors are working with digital tools and woe the businesses that fall behind. Below we have outlined some trends concerning digitalization that are, and will continue to affect the hospitality sector in the wake of Covid19. Some are just around the corner while others are in the near horizon. Either way, the industry will have address these "challenges" in order to stay relevant to the demands of its guests and in order to follow the general development of technology.

Trend 1 – Remote experiences

A curious side effect of the Covid19 pandemic seems to have sparked a desire to partake in experiences remotely. In a recent study conducted by the OTA Booking.com they found that over 36% of the respondents actually preferred visiting a destination they've never been to before if they could get a sneak peek beforehand using virtual reality. (Booking.com, 2022). This would indicate that remote/online/virtual experiences are no longer confined to a period where people were unable to travel due the pandemic but has lodged itself as a permanent feature of guest expectations. This trend is supported by several recent international research projects analyzing the effects of Covid19 on the hospitality sector.

By analyzing 359 responses collected from VR users, (Talwar et al., 2022) concludes that

Our findings also reveal that consumers exhibit an awareness of this and are ready to sacrifice the hedonic pleasure and enjoyment offered by in-situ tourism. In fact, the respondents in our study express intentions to continue using VR tourism to fulfil their travel lust even after the pandemic is over. This finding implies that governments and travel associations should work to capitalise on these
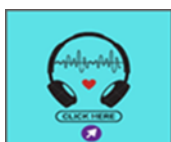
continuance intentions towards VR tourism. Of course, these efforts also require acknowledging the fact that the revenues generated by in-situ travel exceed those generated by ex-situ travel.

In their study of virtual tours as a consequence of the Covid19 Pandemic (Geng, 2022) actually takes it a step further, and concludes on their research that;

Our finding on the ineffectiveness of free virtual tours to attract visitors' physical presence under certain conditions identifies a transformational opportunity to explore novel business models while going virtual. With the advancement of information technology and the evolution of circumstances, virtual tours are not only a supplement that offers a meet-before-you-travel trial or on-site tenhancement but also a substitute that cannibalizes physical demand and could be an alternative source of revenue.

Does this then spell the end for the physical service encounter between the guest and the hospitality provider? Probably not, but it is noteworthy that the pandemic has most certainly changed our perceptions of the interaction between the virtual and the physical experience. This is by no means exclusively a trend within the hospitality sector, and as virtual technologies in general are constantly developing, the possibilities of integrating them in the strategic operations of hospitality companies is becoming increasingly alluring. Either way remote experiences through the use of technological devices warrant further research and efforts from hospitality companies, that seek to accommodate their offering to the future needs of their customers.

Trend 2 – Remote working space

As with any other industry the Covid19 pandemic had a profound effect towards the digitalization of the traditional notion of workspace. Scores of employees around the work learning that their jobs could be handled just as efficiently (and sometimes more efficiently) from the comfort of their homes. Likewise, leaders from virtually all types of industry learned, that employees working remotely did not spell less productivity. The same applied for the hospitality sector.

This may however seem odd as one of the predominant features of the hospitality sector is, and always has been, the meeting between the guest and the service provider – also known as "The moment of Truth". In their research on the hotel sector post Covid-19 however, (António & Rita, 2021) found that although it is not possible (or indeed desirable) to introduce hotels without customer contact, online meetings between the staff and employees with no or little customer contact, would still be beneficial and desirable to most managers from the hotel sector. Thus, the continuation of some of the online practices from Covid19 are expected to be carried on.

Especially the hotel sector needs to address the issue of remote working spaces when it comes to their conference departments where virtual conferences are destined to become more common in the future. This not only requires a massive investment in digital technology to facilitate the online meetings, but also training the hotel staff when the meetings go from psychical presence to digital presence.

Trend 3 This time it's personal – using technology to create personalized experiences

As we argued in "trend number 1" the reluctance of guests in partaking in remote experiences has been negated to a certain degree by the Covid19 pandemic, which in turn has altered the behavior of the guest. We are, "post" Covid19, more prone to use digital experiences and with that trend also comes the possibility to better personalize and cater to the individual needs of the guest.

In their examination of fourth industrial revolution and it's impacts on the hospitality sector in light of Covid19 (Zeqiri et al., n.d.) conclude:

Alongside these developments, AI, the IoT, VR and AR are facilitating close engagement with consumers which leads to loyalty to the particular company. These technologies allow collection of information on people's daily lives, their TV program preferences, likes on Facebook, etc. Purchases using credit cards and searches on Google, along with activities engaged in using or carrying a mobile phone allow data to be stored. However, their interpretation requires some investment in appropriate technologies. The services enabled by technologies include automatic room temperature adjustment, TV controls, control of lighting, wake up calls, self-hotel checkins and check-outs, robot assistance at airports and virtual tours. In nearly all cases, the technologies are not stand alone but are implemented as a set to ensure transformation of traditional business into business 4.0 and to provide consumers with the best individual services and experiences.

In other words: Covid19 has opened the possibility for hospitality companies to use the abovementioned technology to create more personalized experiences for their guest. This however takes investments in technology, knowledge of how to accomplish this and the willingness to integrate the technology in the daily operations.

Especially when focusing on Generation Z and Generation Y personalization through technologically manufactured experiences seem to be on the rise. In their overall rapport from 2021, CBI conclude that:

The rise of mobile devices such as smart phones and tablets has boosted the need among these young generations for private personalisation of their experiences along all phases of the customer journey. The rise in demand for personalised experiences is boosted by technological advancements that make it possible to
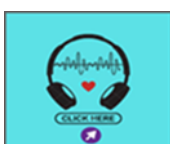
create them. The travellers expect experiences that closely match with their personal preferences, from destinations and accommodation to fine-tuned 'smart' hotel rooms and activities. The better the match, the better the chance that visitors will return and share it with their friends, fans and followers. (CBI, 2021) Already, companies within the hospitality sector keep a close eye on how their service can be made "instagrammable" - in other words worthy to share in SOME platforms, and this trends is set to continue as the above rapport from CBI indicate. Likewise, hospitality companies need to rethink their use of technology so that it becomes an integrated tool in their daily operations and "not just" a marketing tool. We will later in this chapter introduce some of the tools available to hospitality companies in their struggle to become more digital.

36.4. The future situation of digitalization in the hospitality sector

Several mega trends appear to be on the way that will appease the future customers of hospitality offerings, and this is something that the hospitality sector will have to address in the not so distant future. Below we have listed some of the predominant trends that will have an impact of the level of digitalization within the hospitality sector in the short terms, and will require new competencies from hotels, tourism operators and so forth.

Trend 1 – The fifth industrial revolution is on the way…

As accentuated before in this chapter, the hospitality sector should not, and cannot be seen as a business sector which is separated from the general technological development affecting companies from other sectors. Indeed, it will be the hospitality companies that manages to adjust to the new technological reality that comes out on top in the race for the future digitally native guests, and thus an understanding of what the next "revolution" will contain is relevant to analyze.

In a special rapport on technologies of the near future the Mckinsey Technological Counsel in collaboration with external and internal experts (McKinsey, 2022) highlights 14 trends that will have a tremendous impact on companies and consumers in the foreseeable future and which constitutes elements of the fifth industrial revolution. Not all of them are relevant to the hospitality sector, but below we have chosen the 5 most relevant trends that will surely have a tremendous impact on most companies from the hospitality sector in the foreseeable future:

Applied AI: Models trained in machine learning can be used to solve classification, prediction, and control problems to automate activities, add or augment capabilities and offerings, and make better decisions.

How can hospitality companies update for example their booking systems using AI?

Advanced connectivity: 5G/6G cellular, wireless low-power networks, low-Earth-orbit satellites, and other technologies support a host of digital solutions that can drive growth and productivity across industries.

How will hospitality companies use this to enhance the remote exexperiences mentioned previously?

Future of sustainable consumption: Sustainable consumption involves transforming industrial and individual consumption through technology to address environmental risks, including climate change.

How will for example hotels make proactivly to reduce their food waste and thus become more sustainiable?

Immersive-reality technologies: Immersive-reality technologies use sensing technologies and spatial computing to help users "see the world differently" through mixed or augmented reality or "see a different world" through virtual reality.

In order to make Technologically manufactured personal experiences is it vital to understand the technology that

Trust architectures and digital identity: Digital-trust technologies enable organizations to build, scale, and maintain the trust of stakeholders in the use of their data and digital-enabled products and services.

In order to succeed with the above mentioned trends, security and safety becomes a vital issue

Figure 37, Source: Authors' creation.

All the above-mentioned technological trends will have a tremendous impact on the future business models of hospitality companies - to varying degrees off course. Size will for sure play a major role in terms of the ability to implement some of the more costly solutions where, larger hotel chains and tourism operators have a clear financial advantage. However, with the further development of technologies such as AI, VR and so forth (and the ensuing lower price of the technology as it develops) even very small hospitality companies will be able to implement some of the trends above. Adaptability to technology is another key factor. Traditionally, the hospitality sector has not been first movers when it comes to adapting new technologies as part of their business models, and as we stressed previously, Covid19 was a major contribution factor is "pushing" new technological solutions on the industry. It remains to seen how the industry will respond to the future needs of the guests, or if they will fall back to traditional Modus Operandi.

Eventually, the predominant force driving the technological development in the hospitality sector will be the customers and their needs. However, the advancement of digital solutions from the toolbox of the fourth industrial revolution, could also help alleviate some of the immediate threats facing to hospitality industry. In their research on hospitality "post Covid19 (Zeqiri, 2022) highlights the three major challenges facing the hospitality sector – 1) Mass Tourism, 2) The creation of personalized experiences and 3) Sustainability. As they argue, all three can be lessened by the use of technology.

● **Challenge 1** - **Mass tourism:** This phenomenon has been an issue for several major cities in Europe such as Venice and Barcelona, where the influx of tourist to popular sights and attractions have proven to be problematic. Both for other tourist, as the sheer mass of people makes the experience lesser, but also the effect this has on the local population who might not be all too thrilled by seeing their local area crammed with foreigners . By using virtual reality technology this might help alleviate some of the pressure on these popular destinations. Imagine for example taking a guided personal tour through Venice without leaving the comfort of your own home, or go diving with great white sharks in South Africa without being wet?

● **Challenge 2** – **Personalized experiences:** As mentioned before in this chapter, the personalization of experiences is on the rise among the future consumers of hospitality. By being able to extract knowledge from Big Data sources for example, hospitality companies will be able to customize offers and experiences to their customers based on their previous buying behavior. The hospitality companies that are able to do this will thus gain a competitive advantage over their competitor, and simultaneously create a better and more memorable experience for the customer.

● **Challenge 3** – **Sustainability:** In itself, very few companies from within the hospitality sector are sustainable in their nature! Whenever we go on vacation abroad, we use energy on things which strictly – at least according to Mazlow – are not essential for our survival. The airplane we use to travel to Spain cost massive amounts of fuel, which is detrimental to the environment. The hotels we stay in have a massive consumption of resources in order to cater to our needs and so forth. Here, technology such as smart and adaptable lighting in hotel rooms might be of great value to reduce energy consumption! In the restaurant we eat at, smart meters in kitchen will prevent food waste and instead of using energy on transport we might travel the globe using VR technology!

How hospitality companies will deal with the above-mentioned challenge will determine the future of the hospitality sector. The technology is available, but it is not without complications implementing it. Firstly, it will require a substantial investment from the companies in the relevant technology. Likewise, it will also demand new competencies from their employees. The latter, competency development, was highlighted as one of major challenges of working with Big Data (Pahus, 2022) which will be dealt with further in Part 3 of this chapter.

36.5. Sustainability practices

Sustainability Practices

The current situation of sustainability in the hospitality sector

In an ironic twist, the focus on sustainability and sustainable practices from companies is a direct consequence of the development described in subchapter above. One of the many side effects of industrial production was, and very much still is, an increased level on CO2 which has a detrimental effect on the planet we are currently inhabiting.

Global warming as it is commonly known is a very real threat to human existence and also to the various sectors in the hospitality sector as evidenced by the scorching heat waves that hit in the southern part of Europe in the Summer of 2022. The unnaturally high temperatures that has been occurring in the Mediterranean basin for the past 10 years might end up scaring future tourist away which will have serious ramifications on the hospitality sector in the countries of this region (Mckinsey, September 8, 2020). This in turn has spawned the phrase "heat tourism" where travelers might be more willing to choose Stockholm than Rome in the future as their preferred summer destination (New York Times, 2022) Extreme heat can likewise cause problems for travelling as evidenced by the growing number of planes that have been grounded due to high temperature. Essentially, an airplane cannot function in extremely high temperatures, and further heat waves in the countries in the southern part of Europe may cause severe interruptions to airline traffic (Mckinsey, September 22 2020) Additionally there is off course also the concern of the guests when it comes to global warning. Just as governments around the world are ramping up their effort to think and act more sustainable, so are companies from all business sectors being forced to address their part in creating less CO2 emissions in order to prevent further climate changes. As mentioned before, this is indeed on of the future challenges

facing the hospitality sector, especially as most services are not basic necessities in the strictest sense.

36.6. Sustainability in the wake of the Covid19 pandemic?

At the beginning of the pandemic, it was expected by many that Covid19 would have a huge impact on sustainability issues within the hospitality sector. Although not foreseen as the transformative force that Covid19 turned out to be for digitalization within the hospitality sector, the pandemic was projected to play a substantial role in putting focus on global warming and how hospitality companies might address these issues in the wake of the pandemic. Additionally, many experts predicted a change in the consumer demand towards more sustainable traveling and more sustainable hospitality services (Pappalepore, 2022). As the borders were closed during the pandemic, preventing tourist to travel, "staycation" (Not being able to travel abroad many consumers were forced to "stay" at home on their "vacation", and the term "staycation" was thus termed) was a major issue, and this trend was expected to continue post Covid19. Unfortunately, the effects of Covid19 on sustainability and more sustainable traveling has not come to fruition. Instead, there is ample research that suggest that Covid19 has little or no effect on sustainability within the hospitality sector overall as will be described in the next chapter.

36.7. New business models post Covid19 or back to business as usual?

Below we have selected current research and industry rapports to ascertain the effects of Covid19 on sustainability
In their research on Covid19 and its effect on sustainable practices Tauber et.al (Tauber) found very little evidence to support any major changes incurred as a consequence of the pandemic. Firstly, they looked at the supply side (companies from the hospitality sector) to see if any changes had occurred. Their conclusion was however that although Covid19 managed to disrupt sustainability practices for a short while, the ensuing opening of the border and the resumption of pre Covid19 travel behavior has become the norm. What is also important to understand is, that most hospitality companies were financially hit hard by the pandemic and are now in the process of regaining the lost revenue from the pandemic. This makes is less viable that they will invest in a sustainable realignment of the current business model:
Although, after two years of COVID-19-induced business decline, most suppliers such as airlines, hotel chains, cruise operators, leisure parks, or casinos are under
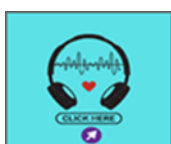
heavy financial pressure. Therefore, most of them first must recover by improving the capacity utilization of existing resources, not emphasizing a sustainable redirection of their business model. We can neither see reasons nor possibilities why and how large international mass-market suppliers and destinations should change their business models as long as the demand side still desires the same and, in former times, profitable products. (Tauber 2022, page 21)

Additionally, they focused of the demand side (the consumers), and here their conclusions were aligned with the findings above:

Based on seven aspects, i.e., demographics, observed destination change for 2019 vs. 2020, effects of the pandemic on traveling, criteria when selecting a different destination, potential influence of a 2020 vacation trip on future traveling, travel push factors, and social values, we could not find any evident signals for a possible impact of the pandemic towards more sustainable traveling and therefore no increased demand for sustainable options in the future. (Tauber, page 20)

Concerning the analysis conducted on the research and… Post covid 19 it is however crucial to emphasize, that as we are currently just on the outskirts of the pandemic nothing conclusive can be said as of yet. Most of the research presented in this section is of "fresh of the press", and it remains to be seen, if the pandemic will continue to haunt the hospitality sector for years to come, and thus forcing more sustainable business models through. The so called "ketchup effect" is also worth considering. It implies that as a consequence of not being able to travel for two years during the pandemic, we are more eager to travel now and this will gradually wear off. Equally we have yet to see the full ramifications of the financial crises following the war in the Ukraine, so nothing is set in stone as of yet.

36.8. The future situation of sustainability in the hospitality sector

The future situation of sustainability in the hospitality sector

Regardless of the Covid19 pandemic and other developments throughout the world, the focus of sustainability will remain a crucial element for companies within the hospitality sector. Now and in the future. Below we have outlined some of the main challenges that the industry is going to face in the future and some of the technologies that might be the key in succeeding towards a greener industry. The challenges are:

- Covid-19 and Sustainable Hospitality Digitalization practices
- Innovations and Sustainable Hospitality Digitalization practices
- Labour Gap and Sustainable Hospitality Digitalization practices

36.9. Covid-19, Innovations and Sustainable Hospitality Digitalization practices

As outlined previously in this chapter, Covid19 was expected by many to be the great accelerator for renewed sustainability efforts within the hospitality sector. Travelers would discover the wonders of their own country, and staycation would be the new trend that kept tourist from traveling around the globe with ensuing increased CO2 emmision as a consequence. The results in the wake of the pandemic however are – at least in the perspective of reducing co2 emissions - that Covid19 was not the great gamechanger for the hospitality sector as was expected. We still want to travel abroad during our vacation and the business model of most companies within the hospitality sector is not set to change substantially in the near future. The pandemic did however allow for the testing of innovative technologies that might eventually lead to more sustainable practices in the hospitality sector. As previously argued in part 1.1 of this chapter, Covid19 gave birth to the adaptation of several new, and indeed sustainable practices, such as VR technologies and AI that would allow for distant travelling without leaving a CO2 footprint in the wake. These specific technologies will be further described in part 2 of this chapter.

Overall, however, Covid19 forced the hospitality industry into becoming more digital than before and several of the tools employed could potentially have a sustainable impact. In the most newly published peer-reviewed paper on sustainable innovations Post Covid19 Elkhwesky et.al (Elkhwesky, Z 2022) conclude that:

This review demonstrates that since the beginning of COVID-19, Hospitality and Tourism have strongly mobilized network technologies (especially social media and digital platforms) and data-processing technologies (especially Artificial Intelligence (AI) and Machine Learning (ML)) in comparison with physical-digital interface technologies (especially Virtual Reality (VR)), while physical-digital process technologies remain very limited in these industries. Several relevant antecedents of the adoption of sustainable innovation, more specifically digital technologies, have been identified at multiple levels of analysis, including the organizational, managerial, and stakeholder levels. (Elkhwesky, Z 2022)

Throughout their research they further elaborate on some of the practices and recommendations that hospitality companies must integrate into their daily business operations in order become more sustainably innovative post Covid19. We have gathered them in the model below with some suggestions on how to apply them (model to be developed)
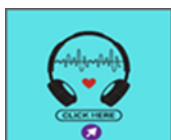
1) Commitment: Hospitality companies must demonstrate a formal commitment to the principles and policies of sustainable development. Specifically on a strategic level.

• Company slogans of "We are the most sustainable hotel in the industry" must be followed be specific actions in their strategic operations.

• The introduction of specific sustainable practices throughout the hospitality companies must take place – reduction of CO2 consumption in hotels, introducing elements of regenerative tourism in destinations ects.

2) Acceleration of usage of digital capacities

• Firstly, by large scale use of accessible and inexpensive technology such as SOME and apps ects.

• Then, by investing in more sophisticated technology such as AI, VR, Robotics ects.

• The first suggestion is easy to implement as it is virtually cost free, whereas the second one will imply investments from the companies.

3) Innovation: The future competitiveness of companies in the hospitality sector is reliant on a massive focus on innovative activities

• This is, according to the authors, especially important when it comes to the company's product, marketing, organization, and business model.

• Secondly, innovative procedures and practices must become a part of the organizations DNA in order to succeed

4) Leadership: Managers of the hospitality companies must adopt a transformational leadership style.

• This is crucial in order to foster the innovative culture among the employees that allows for the integration of innovative sustainable principles and practices to develop and grow.

• As previously mentioned, Commitment was one of the prerequisites for innovative sustainable development in the strategic operations and for this to succeed the "right" management culture is essential.

5) Governments: In order for hospitality companies to increase their capacity for a more sustainably innovative focus post Covid19, it is crucial to receive financial help of governments and policymakers.

• Firstly, this must happen through direct investments in the hospitality companies in order for them to develop the possibilities for the implementation of innovative digital technologies.
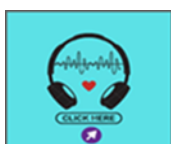
• Secondly, this must happen through the continued investment by governments in improving the infrastructure for digitalization in order to meet the needs of the aforementioned fourth industrial revolution.

6) Educational institutions: Finally, an increased focus from the educational institutions on innovative sustainable hospitality digitalization practices and competencies is required.

• Educational institutions must focus to a much higher degree on integrating digital sustainable hospitality in their courses with a specific focus on innovative practices.

• This should be done in close collaboration with the hospitality industry
Figure 1: Authors' creation based on (Elkhwesky, Z 2022)

The model above list 6 specific challenges that lie ahead for the hospitality industry as a whole in order to work with Innovations and Sustainable Hospitality Digitalization Practices Post Covid19. Some are easier to process than others, but overall they pose a significant challenge to the hospitality sector. Some of these challenges are directly connected to the next topic concerning the Labour Gap shortages, which will be coved in subchapter 1.2.3.2

36.10. Labour Gap and Sustainable Hospitality Digitalization practices

Lastly, we will address the labour gap in terms of Sustainable Hospitality Digitalization practices, which currently is a major challenge to several companies from the hospitality sector. According to EHL insights (EHL, 2022) the primary reason for labour shortage in the hospitality sector is caused by three factors which have gained prominence in the wake of Covid19:
Several different factors converge to create a labor shortage in the hospitality industry. One is wages, where employees in roles that traditionally pay low or have tipped wages, such as the restaurant segment of the industry, tend to leave jobs at higher rates than employees in other sectors, because wages are low. Another is technology: Hotel employees are increasingly expected to use technology, and some workers (including older workers and those who have less familiarity with technology due to income barriers) are pushed out.
Generational factors contribute too, as older employees who have decades' worth of experience in hospitality skills near retirement age.
Some hotels are turning to technology to fill the gap. Hotel culinary teams have been especially hard-hit by the skilled labor gap, so many are turning to cooking technologies that increase efficiency, such as pre-portioned, vacuum-sealed menu
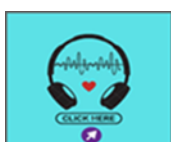
items. Others are scaling down the complexity or burdening existing team members with extra duties– tasking a prep cook to make bread instead of hiring a baker, for instance. (EHL, 2022)

These findings are underlined by resent research by Carlisle, Sel. Al (Carlisle, S, 2021) on the future skills required in the tourism sector. In their research project they conducted 264 interview and additionally had 1404 respondent in a survey with executive and managerial staff from 8 different European countries. Their overall conclusion was that

The most important future digital skills reported by respondents include online marketing and communication skills, social media skills, MS Office skills, operating systems use skills and skills to monitor online reviews. The largest gaps between the current and the future skill levels were identified for AI and robotics skills and AR and VR skills, but these skills, together with computer programming skills, were considered also as the least important digital skills for tourism and hospitality employees in the future. (Carlisle, S, 2021)

In conclusion on the Labour Gap shortage: More focus needs to be on the managerial role in dealing with the challenges, and this in turn leads to a stronger focus on the cultural aspects of hospitality organization as was one of the key takeaways from subchapter 1.2.3.1.
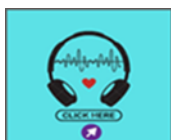
37. International contemporary hospitality professional environment: review of current know-how, insights on technologies used for hospitality digitalisation, current and upcoming opportunities and international practices

In the following chapter, we will provide specific insights into technologies used for hospitality digitalization including current and upcoming opportunities and international practices used by hospitality educational and industry organizations. Whereas part 1 of this chapter sought to describe the overall trends and developments, this chapter will introduce some of the current and not so distant technologies from the hospitality sector.

37.1. The specific tools, devices and software

The specific tools, devices and software

37.1.1. The tools
The world of hospitality is becoming more and more modern. The use of different tools help to make things easier. Some of the tools used in hospitality are (Renovales, 2022):

A.   Apps for payment

A lot of bars and restaurants use mobile applications to order and pay for your products. Clients can see the menu in the mobile, select the order, see the price of their purchase and get the bill on the phone. This is a way of flexibility and saving time for clients and waiters. An example of these apps is BR Bars and Restaurants

B.   A point of sale

Hiopos is a tool that serves as a point of sale for hotels, it makes the management of a business easier. There are different versions depending on the kind of business (cafes, restaurants, and so on). It provides a business analysis and real-time business information.

Camarero10 is an app that manages tables and payments, it sends the order immediately to the kitchen.

C.   Control the restaurant from your phone

Miss Tipsi has been created for restaurants. It enables the control of the restaurant: the orders, the opening and closing of tills, tables, reservations,

stocks, payments in all ways (dividing the payment, creating bills, personalising receipts..)

Numier is a management tool that allows you to know everything about your business in real time (storeroom stock, suppliers, operators, agencies …)

Hosteltactil allows you to be informed of everything that happens, it enables you to manage the business at any time from anywhere. It won a prize for its innovation. It divides the information into 8 boards: sales, tills, the dining area, the incident control, human resources, products, history and reports.

Hiboutik offers a version for restaurants that offer a simpler way to manage catering. The orders are taken by the phone and sent to the kitchen, receipts are printed and recorded. It also gives the option to help the kitchen to manage the orders.

D.   Cash register

Tiller enables take payments, manage and analyse the business. It makes the taking of orders quickier, it enables to consult data, to control stock, to track sales and to control staff.

E.   Digital signature solutions

The process of signing digitally improves the check-in process and services like car rentals. Clients can firm by handwriting in any phone or device. The management of invoices can also use digital signatures.

This tool is also used by human resources in hotels. Contracts and payrolls can be signed digitally.

The use of digital signature makes a hotel sustainable, it reduces the printing on papers of different documents and it encourages eco-friendly practices

F.   Contactless technology

Smart hotels are very common nowadays. They reduce the face-to-face interaction, clients can do the check-in themselves without the help of a receptionist. This is possible if they do the check-in from their phone and obtain a digital key. Intelity is a platform that helps to get these characteristics. Apart from the check-in, this platform has the option of booking services, like a massage or a lunch.

Bowo and Hoteza are other similar platforms . They give the option to access the different devices in the room, like the TV, from the phone (Wadhva, 2022) .

G.   Accessibility support

It is important to give the same opportunities to the people with accessibility requirements. Mobility Mojo is a tool that helps hotels to add Hotel accessibility to their website.
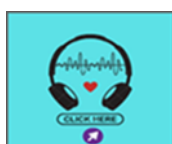
H.   Eco-applications

Some hotels have created their own applications that include walking tours for the guests promoting sustainable tourism.

37.1.2. The Software and devices

In Hospitality you can find many software focused on reducing administrative tasks and cutting costs.

The main benefits of these software could be the following (Revfine, 2022):

- Reduce costs by automating tasks.
- Increase revenue by automating marketing and revenue management.
- Enhance staff efficiency.
- Improve staff productivity.
- Rationalising accounts.
- Replace paperwork processes and help the environment.
- Communicate more effectively with customers.
- Keep your booking dashboard updated at all times.

Following revfine (2022), some of the most useful hotel software are:

37.1.3.   Property Management System (PMS)

PMS is a system focused on administration and booking tasks. The property management system has been developed into a platform that helps hotels gain more visibility and enables them to reach out to the audience to increase bookings. PMS is a system focused on administration and booking tasks. The property management system has been developed into a platform that helps hotels gain more visibility and enables them to reach out to the audience to increase bookings. Through this software, the hotel staff can process e-payment collection and manage room inventory for accurate allocation. In addition, PMS prevents overbookings, duplicate reservations or sending confirmation emails after reservations.

37.1.4.   Revenue Management System (RMS)

The purpose of RMS software is to improve pricing strategies in order to sell more rooms at optimal rates. RMS works to help hotels create prices for their rooms based on algorithms. It has some advantages for the hotels including strategic pricing and higher revenue, but there are many more benefits that hotels can make use of. Firstly, RMS lowers costs as it takes into account the room rates

during the low and high seasons. As a result, the hotel manager can plan and lower costs by avoiding unnecessary expenses.

37.1.5.   Distribution channel manager

Channel managers are useful for all types of hotels. The function of a channel manager is to connect the hotel's inventory with multiple online channels or travel agencies. This software allows you to manage your hotel's pricing and availability across all the marketing channels you use online. A channel manager is also important to avoid overbooking and prevent other costly errors, as it has the ability to report on booking sources. The hotel owner can then determine which online channels or portals are best suited to their niche market. With such sophisticated tactics and systems, travellers can quickly find the accommodation they need.

37.1.6.   Rate shopper software

Through this software you will be able to access real time information and data about your competitors, including their prices and promotions. The benefits of using it are that it has simple graphics and is easy to use, that helps staff to optimise room rates. In addition to revealing useful information about other hotels, this software will also allow you to monitor your ranking by tracking events in your local area and obtaining statistics on the average prices charged by hotels in your area. The main benefit of using this software is ultimately to gain insight into the local hotel industry in order to stay ahead of the competition.

37.1.6.   Reputation and Review Management Software

Reputation and review management software is designed to track online users' feedback on services and products. It is a system that helps spread the customer's positive and negative reviews through the relevant online platforms. It also could be a good thing for hotel owners as they will be able to increase their sales this way and to make improvements following customers' opinions. It is also a useful tool that helps hotel owners monitor social media posts relating to their services. This software allows you to monitor what your guests are saying about your hotel by sending you alerts, so the hotel can respond and solve the problems immediately.

31.1.7.   POS software for all hospitality businesses

POS software is a computerised network made of software and hardware components that process and record payment transactions between a company and its customers.

POS systems are widely used in restaurants and hotels. It allows for collecting guests' orders and purchases from different points of sale and charging them directly to their room or table. It is an agile, intuitive solution and an essential tool that helps consolidate and optimise such areas of business management as sales through multiple channels, inventory management, customer management, and marketing. In addition, it serves as a crucial source of information that can be used for further analysis and decision-making.

POS systems allow hotels to optimise their daily operations with the help of the following features:

●   Payment processing. Customers can pay with different payment methods, i.e., cash, debit/credit cards, checks, etc. POS systems accept, verify, and process such transactions.

●   Inventory management. POS software can track your stock levels and send customised alerts when the quantity drops below a predetermined amount.

●   Customer management. Collecting information about your guests and their transaction history in your hotel can help you build stronger customer relationships, personalise guest experience, and influence your marketing campaigns.

37.1.8.   My Green Butler

My Green Butler is the world's software focused on sustainable hospitality management systems. It is proven to save +30% energy, 21% water and food waste, cutting corresponding carbon emissions and costs (The Sunx Program, 2020). My Green Butler works by monitoring an eco-nexus of resources, audits electricity, gas, biomass, solar, water, laundry and waste and shows you where and why you have wastage.

Managers and staff receive persuasive communication that guides them to take adaptive measures to save resources. Useful eco-feedback stimulates synchronised collaborative behaviours. Powerful analytics identify savings to build continuous improvement.

37.1.9.Guest-facing systems
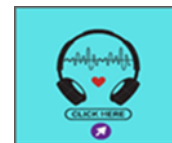
Guest-facing systems

Within the sustainable digitalisation of hospitality, guest-facing systems play an important role. Guest-facing systems are some of the main interfaces that enable the interaction between hospitality service providers and guests. These guest-facing systems must be simple and user-friendly interfaces to enable guests to manage their entire experience in a successful and easy way. The guest-facing systems are integrated in all three phases of the customer experience, pre-sales, point-of-sale and post-sales, so that a complete digital guest experience can be offered.

Customer-facing systems help to improve the user experience in different ways, for example by allowing them to control their environment and thus ensuring their satisfaction (automatic or keyless entry, control of in-room functions, room service with tablets, etc.). Another way in which they improve customer satisfaction is by improving location-based services (on- and off-site). And they also help facilitate customer participation in loyalty programmes.

The most common guest-facing systems are:

● Thin Client Terminal: A thin client is a computer that is characterised as a lightweight computer without a hard disk. Thin clients are also centrally managed which means that most of their memory, applications and data are stored on a server, this server can be a cloud server or a peripheral server on site (hotel, restaurant or any other hospitality related establishment). A thin client differs from a fat client in that a fat client is a fully-featured computer, while a thin client relies on a server to handle most of its workloads. In general and in the hospitality sector thin clients allow for a virtual business environment, reduced costs, improved security features and scalability, which help to improve sustainable digitisation. The main advantages are:

○ Having thin clients means less administration, maintenance and support effort.

○ Having thin clients means more difficult information filtering and virus propagation.

○ Having thin clients means lower maintenance costs, as there is less hardware.

○   Having thin clients means lower electricity usage due to lower power, thus contributing to energy savings.

○   Having thin clients means increasing the durability of the equipment; a heavy computer has an average life of 3 years while the light ones have an average life of 10 years.

○   Having thin clients means that data can be consulted by users at a higher speed because the information is not downloaded but consulted on the server.

●   Kiosk: Kiosks are touch screens installed in a hospitality business which allow customers to choose the products they want to buy and make their own purchase. Kiosks have become a common element in restaurants, shops and hotels, among other hospitality businesses as the pandemic, and the labour shortage that has come with it has prompted the preference for kiosks by both employers and customers due to the great advantages they offer (NEC Today, 2021):

○   Reduction of queue: All card payments can be made directly through a self-service kiosk, leaving only cash payments at the cash box. This significantly reduces queues and also allows most of the businesses staff to prepare orders so that everything works more efficiently.

○   Sales opportunities: Kiosks offer order customization that allows customers to add products or choose other options, discounts,etc.

○   Higher order spend: According to recent research, kiosks generate higher revenues for entrepreneurs, as the order value is generally higher.

○   Key data: Self-service kiosks can capture key data on customers' spending habits and target them with messages at optimal times. This data provides instant feedback on customer experience and satisfaction.

●   Remote Control: One of the most innovative technologies implemented in hospitality businesses such as hotels is voice remote control systems. It works through a combination of artificial intelligence that allows the devices to recognize speech patterns, while Internet connectivity allows the devices to transmit relevant information to answer questions. The benefits of this technology are:

○   Hyper-personalization: By implementing voice-controlled smart hubs in hotel rooms, guests can more easily adjust various room features, including heating, air conditioning, lighting and other features.

○   Information provision: Travel and tourism information can be obtained in real time by asking a question to a device (without the need for the guest to leave their room) which ensures that it is up-to-date and can be location-based, ensuring that directions, travel times and other information are even more accurate than human knowledge.
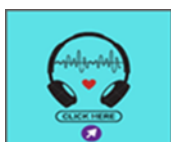
○ Customer service: Voice control can also be used for more general customer service purposes such as scheduling a service call, placing a room service order or requesting more towels, simply by talking to your smart hub, with no queues or delays, and no need to go down to the front desk (Revfine, 2022). Voice-controlled smart hubs can also be synchronised with other hotel services, making them easier and faster to access.

● In-Room Tablet: The integration of In-Room tablets in hotels can provide a better guest experience that drives engagement due to the multiple benefits it offers (Campbell, 2022; Hibox, w.d.):

○ Powerful upselling tool: In addition to providing key hotel information, the most revenue-generating feature for the business is the ability for the guest to order room service directly from the tablet, without even having to use the room phone.

○ Smoother communication: If the hotel has a large international demand base, the difficulties generated by translation into different languages disappear with a tablet. Customers can select their native language and review all available information in it, in addition to being able to make requests in their language, which in turn are sent translated to the hotel staff in charge of attending to them.

○ Real-time analytics: The hotel staff can see what the customer is doing, what pages they are visiting, and automatically send them messages specifically targeted to their online experience and upselling through the application. For example, if the hotel staff sees that the customer is continually consulting the spa's massage offer but he/she does not book it, the hotel staff can encourage him/her to do so by sending a promotion for that service.

● Cell Phone: Mobile devices have stopped being only a means of verbal and written communication, becoming an essential tool in our daily lives and especially in the hospitality industry where it plays a very important role due to the multiple services it offers mainly to improve the customer experience when travelling, for example. Among these services, we can highlight:

○ Organisation of a trip.

○ Comparison of different destinations.

○ Information and recommendation of accommodations.

○ Hotel booking.

○ Meteorological consultation.

○ Map location.

○ Search for restaurants and purchase of any product.

○ Publication of experiences in social networks.

In addition to becoming the customer's tour guide, it is comfortable to wear, thus it is important that hospitality businesses adapt their communication and services to these devices.

● Point of Sale Terminal: Point-Of-Sale (POS) systems are considered a multipurpose technology in the hospitality sector since it not only aims at sales and payments processing but also to monitor performance and reports creation, among others (Revfine, 2022). These systems have become very popular in recent years because they provide speed, efficiency and satisfaction. Among the main advantages of POS, we find:

○ It speeds up the sales and post-sales processes. It has in a single space everything necessary for the management, there is no need to resort to various programs or devices, or of course, do things by hand.

○ It offers the possibility of keeping a more exhaustive control of sales and of better management. Depending on the software, the business staff will be able to see sales statistics, for example.

37.1.10. In-room IoT sensors

In-room IoT sensors

IoT plays an important role in increasing efficiency and improving customer services in the hospitality sector industry. Implementing IoT solutions in the hospitality industry allows owners to use data-driven alerts and triggers. In addition, IoT enables the front desk, concierge and staff to conveniently address customer needs. The hospitality industry presents many opportunities to use automation solutions to enhance smart hotel rooms. Guests enjoy greater convenience and comfort, and hotel owners and operators benefit from increased efficiency, cost savings and guest satisfaction (Stayntouch, 2021).

IoT is a smart solution that eliminates the traditional process for the check-in and opens up new possibilities in
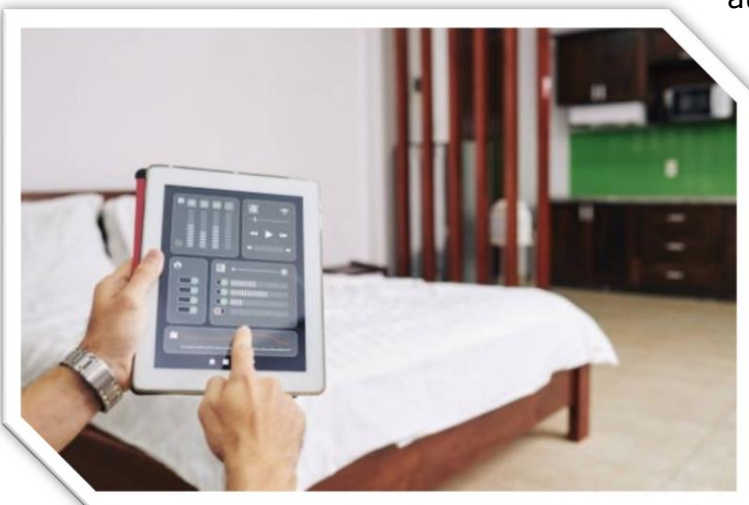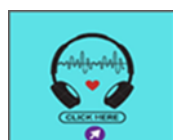

Figure 38, Source: pexels-miguel-á-padriñán-3936421

terms of making the whole process seamless. With IoT, hotels and apartments can automatically send a digital or electronic key to a guest's mobile phone an hour before the check-in time.

Through this method, guests can communicate with the door, unlocking it, and removing the need for a separate key. On initial use of the key card, the guest is automatically checked in without them ever having to stop at the front desk

Some of the benefit of implementing IoT sensors in hotels are (Operto, 2022):

● Better guest experience: Using this kind of tech, the guest can experience control over their stay, from their in-room amenities to communication with staff.

● Operational efficiency: IoT solutions help management and staff maintain visibility into room usage; connect reservations, staff scheduling and security through their PMS; and improve internal communications.

● Lower staffing costs: Through these automated processes, there will be a reduced need for staff and a reduction in turnover rates and training costs.

● Increased Safety and Security With Smart Rooms: Guests can use a secure app on their phone to unlock their hotel room's door instead of using a key that could be lost or stolen.

The most common IoT used in Hospitality following the trends of Rinf.tech (2022) is:

Automated Check-In: many smart hotels are moving to automate the guest check-in process. These self-service stations allow guests to avoid lines at the reception desk and receive their room keys (or room codes) with ease.

Figure 39, Source: pexels

Asset Tracking: In an IoT smart hotel equipped with asset tracking technology, guest services staff have the ability to track equipment such as luggage racks and cleaning carts. Real-time monitoring can make smart hotels run efficiently

Smart room customizations: with the IoT devices connected and installed in a hotel rooms could be more comfortable and convenient for guests. Some of the customizations can include:

- **Room temperature**: Smart thermostats allow guests to make their room comfortable

- **Lighting:** a variety of options for dimming, changing colores, lights etc.

- **Water temperature:** this sensor helps to control and maintain the water temperature for guests.

- **Smart TVs**: this is more frequently used in most of the homes nowadays, so It must be essential in an smart hotel

- **Curtains and shades**: motorized window treatment allow guest to be more comfortable

- **Food menus:** it can be available on the smart tv or phone app for the automatic delivery of food.

Smart lock and security: Hotel rooms with smart locks allow guests to use a phone app as a room key, replacing the need for a traditional room key or key card. IoT in the hospitality industry enables safer hotel stays and increased peace of mind for guests.

Enhanced Event Rooms: Customizable lighting can be adjusted to hold any type of event and other elements, such as temperature controls and window treatments, can be scheduled and automated according to event hosts' needs

For effective custom IoT solution development and deployment in hospitality, tech partnerships with IoT-specialised consultants and software houses are essential. Finding a partner with robust infrastructure, access to software and hardware engineering talent skilled in embedded development, middleware and microcontrollers, cybersecurity, robotics, data science poses another big challenge Hospitality services, body area sensors.

The hospitality sector, which has been strongly affected by the spread of the Covid-19 pandemic, is facing a difficult and challenging time when a lot of effort, creativity and resilience must be provided. Therefore, the digitalization of the hospitality sector becomes a short-term objective, especially because of the opportunities for recovery and economic growth that it can offer to the sector after a really difficult period of time (Easygoband, 2022). In general, sensors are pieces of hardware that detect changes in an environment, collect data, communicate and share it with connected devices through a network . All this collected data allows devices to work autonomously, thus making the whole ecosystem "smarter". Specifically body area sensors applied to the hospitality sector, are key to support the transition towards the digitalization of the hospitality industry as they can provide efficiency in the management of tourism services, saving time

and costs as well as knowing more closely the needs of the customers in order to better adapt services to their needs. Nowadays, new technologies highlights the importance of the following body area sensors applied to the hospitality sector:

● **Temperature sensors**: These kinds of sensors were introduced with higher levels of frequency in hospitality sites and buildings since the beginning of the coronavirus pandemic, but above all, when the reopening of hospitality businesses was allowed after multiple lockdowns in the first year of pandemic. Throughout these sensors, individuals are scanned at regular intervals to monitor their body temperature and check if it is elevated or not at any time. This way, for example, if an individual's body temperature is higher than stipulated, a warning is sent to the control monitor or security personnel and the corresponding protocol is initiated (Rechner Sensors, 2019)

● **Smart clothing:** These kinds of sensors have recently been introduced into the hospitality industry. Smart clothing applied to the hospitality sector refers to clothing items that are made of "smart" fabrics with the main purpose of having these items geolocated and avoiding their theft. This is made possible by a chip embedded in the fabric that communicates a variety of useful information that increases efficiency, saves time and reduces management costs. With this sensor in items such as hotel towels or sheets, hotel workers can know where they are at any time and even whether they have been washed and with which products (Preferente, 2018).

● **Smart shoes:** Smart shoes allow you to discover the city without having to consult maps of any kind. They consist of a device connected by Bluetooth to a mobile application that identifies through a GPS the selected destination (Butler, 2016). The chip linked to the mobile application is inserted inside both shoes and alerts the user through vibrations in order to guide her/him towards the established destination, which must be previously set up through the mobile application.

● **Smart watches:** The integration of smart watches in hotels has become more frequent in the last few years. They are rather used by hotel staff as a way to assist hotel workers in improving the overall guest experience and delivering better customer service by enabling hotel staff to manage guest requests and resolve incidents more effectively and efficiently (i.e. request for more towels or to fix a broken sink) without necessarily carrying out a phone or something similar (Ting, 2018). This way, the management staff can see and track all the tasks in real time and make sure that the requests are successfully met.
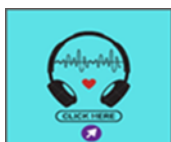
37.2. Energy Management

Energy Management

EU hotels are in a strong position to access renewable energies as over a third of the world's renewable power capacity is located in the European Union. Hotels can benefit from the use of renewable energies for example, water heating, heating and air conditioning and air conditioning (Kapiki, 2010). The use of renewable energy can reduce local air pollution, maintain the quality of the destination and improve the guest experience.

Figure 40, Source: pexels-bruno-scramgnon-315658

Energy efficiency and conservation practices can improve the reputation among guests and people who are concerned about reducing overall energy consumption and the effects of climate change .

The main energy consuming systems in hotels are (Kapiki, 2010):

● Heating.

● Air conditioning and ventilation.
● Hot water production.
● Lighting.
● Electricity.
● Cooking.

Technology is used in most hotels in order to extend in-room comfort and at the same time reduce the consumption of energy

There are several contemporary tools offering to the hoteliers of today efficient energy solutions and significant cost reduction. Most solutions promise up to 30% of energy cost savings and return on investment of 20% to 50%.

Some of sustainable and easy to adopt tools are (Kapiki, 2010):

- **Eco-labelling:** It is a voluntary certification and labelling method on environmental performance and labelling that is practised worldwide. There are currently more than 100 ecolabel programmes for ecotourism, hospitality and tourism around the world, although most ecolabels are for the accommodation sector and are based primarily on energy, water and resource conservation and waste management. primarily on energy, water and resource conservation and
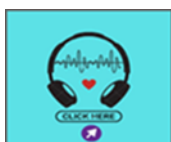
waste management. Eco-labels are thus both a marketing and an environmental management tool because it reduces the consumption of natural resources like energy and water helps towards reducing a property's costs.

- **Wireless energy management:** the wireless network supports multiple controls for the hotels' main energy consuming equipment. The system also enables real-time wireless monitoring of the total electricity consumption of the entire building. More importantly, it brings the entire process directly to the process directly to the Internet, enabling remote monitoring and control from a central location. Given the increasing need for the hospitality industry to bring down overhead costs, more and more hotels are integrating energy management systems into their properties

In addition, when hotels apply some kind of solution for energy management, they will have some benefits:

● **Control energy-consuming systems:** An energy management system is the brain that powers your hotel's HVAC systems, lighting systems, power outlets and even smart devices such as blinds, locks and TVs in rooms and public spaces.

● **Application of programmes, rules and logic to reduce energy consumption**: Based on manual inputs or algorithms, an EMS strategically controls building systems to optimise energy and cost savings. For example, you can programme the system so that outdoor lights turn on at 9pm and turn off at 7am. Or you can program the system to maintain lobby temperature and the system will adjust the climate control in response to outside temperature, sunlight and occupancy.

Figure 41, Source: at pexels.com

● **Monitor usage and performance in real time:** The EMS control panel allows you to track energy usage in real time, so you can see how many lights are on or how many air conditioning units are running at any given time. Other features include the ability to analyse consumption and cost savings over time with robust reporting capabilities.
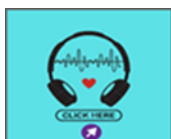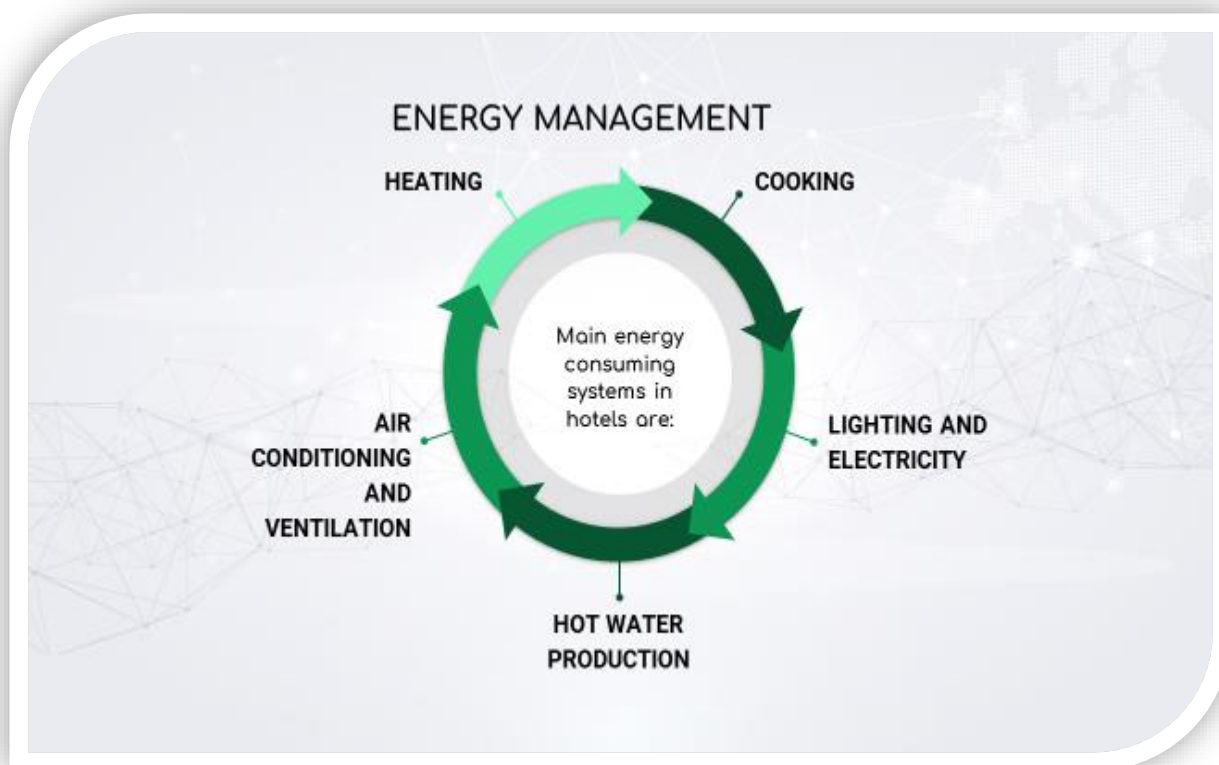
Figure 42, Energy Management. Authors' design

37.3. Building automation and monitoring

Building automation and monitoring

Some hotels are installing a management building system that integrates smart technologies and analytics , these technologies are used to know things like energy efficiency. This system lets you know what is happening in your building and makes possible the improvement of it (Attala, 2018).

The system gets data from all the machines of the hotel, it permits preheating the rooms, lights can be more tenuous when it's sunny. This makes the building more efficient and it saves energy (Vikey, 2022) .

Moreover, this affects the maintenance of the building too. A platform that revises the maintenance of the machines regularly prevents the failures and eliminates waste.
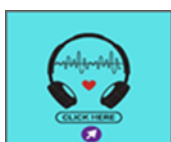
- **Indoor Environment Quality (IEQ) monitoring:** With the COVID-19 pandemic, the quality of the air has been considered very important. IEQ was focused on reduce energy consumption and now it is in provide a good quality air

- **Energy consumption optimization:** Building automation systems adjust room conditions such as power and lighting , it also takes into account checked in rooms and unused rooms.

- **Asset tracking**: Guests can track services like luggage racks. The evaluation at real time can improve the services

- **Customer service with Voice Control**: Some hotels have adopted a service with voice control, this allows customers to request hotel room service, to book some activities or a table in the restaurant.

- **Smart locks and security solutions:** Smart locks allow customers to use virtual keys, they open the rooms with their phones instead of with a card.

- **Foot traffic management**: It tracks the number of people entering or leaving any premises

- **Cleaning and sanitation services**: This technology serves to maintain every place in the hotel clea, it notices used and unused areas.

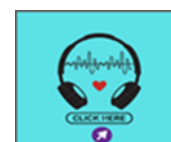

Figure 43, BUILDING AUTOMATION AND MONITORING. Authors' design.
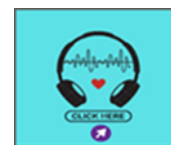
37.4. Augmented reality

Augmented reality

Augmented reality (AR) alteres people's perception of their surroundings through the use of computer technology. Compared to virtual reality (VR), the difference is that VR replaces the real world with a virtual one. Augmented reality places virtual things in the real world.

AR is becoming important in the Hospitality industry because it gives the possibility to hotels to improve the environment they are selling. AR is also useful to solve the questions that guests make before arriving at the hotel (Augray, 2022; Muskan, 2021).

Examples:

A.   Interactive Hotel Rooms

There is a hotel in the United Kingdom has wall maps in its hotel rooms, if you point your smartphone in the map , you can see additional information abou places of interest

B.   Gamification

Hospitality is using AR games to improve their experience, an example is to create their own map to explore the hotel.

C.   Augmented Hotel Environments

Some hotels use AR to make the experience of guests impressive. For example, guests can point their phones and see virtual famous people in the hotel.

D.   Guest recognition

AR applications can help giving details about the guests that repeat in the same hotel, about their preferences, this will permit give the guest a personalized experience.

E.   Maintenance Information

Guests can obtain information about the areas in maintenance in the hotel

F.   Translation Facilities

AR makes the translations of indications easier for guests from many countries, they can point their smartphones at the texts to get the information in multiple languages

G.   360-degree view of the Hotel

With AR technology guests can have a proper view of the entire hotel, the rooms, the amenities…

H. Interactive menus

After COVID, many restaurants have a virtual menu that guests can access by reading a qr code with their phones. If you incorporate AR technology, costumers can visualize food.

I. The history of the hotel

Some hotels have paintings, sculptures… To let the costumers know the history of these things, AR can be used. With a QR code, they can obtain information an see it in 3D.
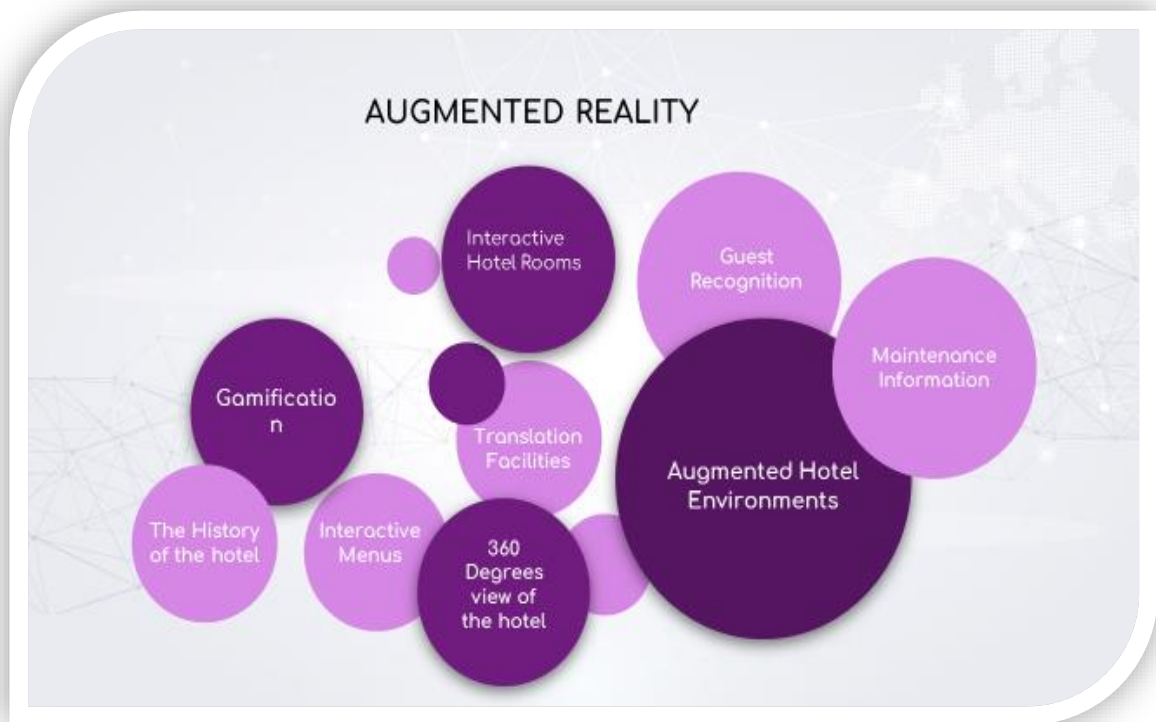
Figure 44. Augmented Reality. Authors' design.
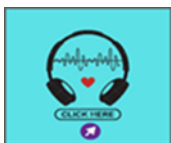
37.5. Beacon technology

Beacon technology

Beacon is a location-based sensor that can be placed anywhere in a hotel. Beacon technology is connected to the concept of augmented reality. The way of using it is through Bluetooth, customers receive information in their phones, for example a virtual key or a map of the hotel. It is a wireless bluetooth device that transmits a signal that other bluetooth devices such as smartphones can 'see'. Beacon devices do not transmit random signals. It is transmitting a unique ID number that tells the listening device which beacon it is next to (Plot Projects, 2022). This can create a real time interaction with the customers.

Some ways of using Beacon sensors in hospitality is:

● **Check in service:** the guests receive a welcome message when they pass the doors of the hotel. The guest neither has to wait in a queue, nor search for the reservation number, and the app has already retrieved their personal details from the time of booking the room.
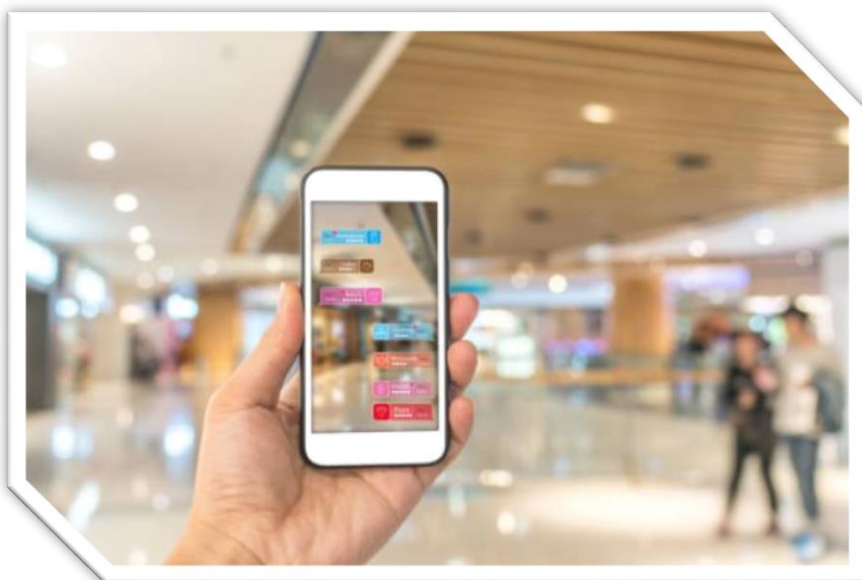
Figure 45, Photo Source: www.groundtruth.com

● **Finding the room and indoor navigation:** This feature enables indoor navigation similar to GPS, in settings where GPS signals are not available. Using beacons guests can have virtual maps and turn-by-turn directions to their room or their favorite destinations inside the premises of your hotel.

● **Keyless entry into rooms:** when guests use digital checking, a digital key is sent to their mobile phone.

● **In-room controls**: most hotels require users to swipe a key-card simply to turn on the lights, which generates great energy savings. Beacons make it possible to detect the guest is in his room and enable a new set of services on his mobile device to control lighting, temperature, the TV, etc.

● **Room services**: The beacon inside the room is aware that the guest is in the room. A message will be sent to the guests to check the menu for showing food options

● **Spa hotel services**: When the customers walk the spa areas, they'll receive a message with offers

● **Bar-restaurant**: The guests will receive messages with offers of food and drinks when they are near the restaurant area. Using iBeacons, hotels and restaurants will be able to customize promotions to specific locations

● **Other hotel guest amenities**: Some deals can be sent to guests in areas like the casino

The benefits for the hotel are (Plot Projects, 2022):

● Improve the guests' experience.

● Create new opportunities.

● Get data in real time to analyse.

● Improve the hotel's staff productivity.

● Boost productivity & improve margins.

● Occupancy monitoring.

● Asset tracking.

The benefits for the guests are:

● Easier check in.

● Special offers.

● Message about hotel services.

The most common use of beacon technology is proximity marketing. It can work in two ways: to be simple, such as showing an app user a notification with a coupon for a product they are near, or displaying in-app content with a description about a nearby event. Or it can be complex, such as calculating the user's location based on their proximity to a beacon.

BEACON TECHNOLOGY

Beacon is a location-based sensor that can be placed anywhere in a hotel. *Beacon technology* is connected to the concept of augmented reality. The way of using it is through Bluetooth, customers receive information in their phones, for example a virtual key or a map of the hotel. It is a wireless bluetooth device that transmits a signal that other bluetooth devices such as smartphones can 'see'. Beacon devices do not transmit random signals. It's transmitting a unique ID number that tells the listening device which beacon it's next to. This can create a real time interaction with the customers.

The benefits for the hotel are:

- Improve the guests' experience.
- Create new opportunities.
- Get data in real time to analyse.
- Improve the hotel's staff productivity.
- Boost productivity & improve margins.
- Occupancy monitoring.
- Asset tracking.

The benefits for the guests are:

- Easier check in.
- Special offers.
- Message about hotel services.

Figure 46, Beauccon Technology. Authors' design.

THE TOOLS:

The use of different tools help to make things easier. Some of the tools used in hospitality are:

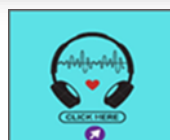| Apps for payment	A point of sale	Control the restaurant from your phone	Cash register
A lot of bars and restaurants use mobile applications to order and pay for your products. Clients can see the menu in the mobile, select the order, see the price of their purchase and get the bill on the phone. This is a way of flexibility and saving time for clients and waiters. An example of these apps is **BR Bars and Restaurants**	**Hiopos** is a tool that serves as a point of sale for hotels, it makes the management of a business easier. There are different versions depending on the kind of business (cafes, restaurants, and so on). It provides a business analysis and real-time business information. **Camarero10** is an app that manages tables and payments, it sends the order immediately to the kitchen.	**Miss Tipsi** has been created for restaurants. It enables the control of the restaurant: the orders, the opening and closing of tills, tables, reservations, stocks, payments in all ways (dividing the payment, creating bills, personalising receipts..) **Numier** is a management tool that allows you to know everything about your business in real time (storeroom, stock, suppliers, operators, agencies ...) **Hosteltactil** allows you to be informed of everything that happens, it enables you to manage the business at any time from anywhere. It won a prize for its innovation. It divides the information into 8 boards: sales, tills, the dining area, the incident control, human resources, products, history and reports. **Hiboutik** offers a version for restaurants that offer a simpler way to manage catering. The orders are taken by the phone and sent to the kitchen, receipts are printed and recorded. It also gives the option to help the kitchen to manage the orders.	**Tiller** enables take payments, manage and analyse the business. It makes the taking of orders quicker, it enables to consult data, to control stock, to track sales and to control staff.

Figure 48, THE TOOLS. Source: Authors' design

THE TOOLS:

The use of different tools help to make things easier. Some of the tools used in hospitality are:

Digital signature solutions	Contactless technology	Accessibility support	Eco-applications
The process of signing digitally improves the check-in process and services like car rentals. Clients can firm by handwriting in any phone or device. The management of invoices can also use digital signatures.	Smart hotels are very common nowadays. They reduce the face-to-face interaction, clients can do the check-in themselves without the help of a receptionist. This is possible if they do the check-in from their phone and obtain a digital key. **Intelity** is a platform that helps to get these characteristics. Apart from the check-in, this platform has the option of booking services, like a massage or a lunch.	It is important to give the same opportunities to the people with accessibility requirements. **Mobility Mojo** is a tool that helps hotels to add Hotel accessibility to their website.	Some hotels have created their own applications that include walking tours for the guests promoting sustainable tourism.
This tool is also used by human resources in hotels. Contracts and payrolls can be signed digitally.			
The use of digital signature makes a hotel **sustainable**, it reduces the printing on papers of different documents and it encourages eco-friendly practices	**Bowo and Hoteza** are other similar platforms. They give the option to access the different devices in the room, like the TV, from the phone.		

Figure 49, THE TOOLS. Source: Authors' design

Property Management System (PMS)

PMS is a system focused on administration and booking tasks. The property management system has been developed into a platform that helps hotels gain more visibility and enables them to reach out to the audience to increase bookings. Also it prevents overbookings, duplicate reservations or sending confirmation emails after reservations.

POS software for all hospitality businesses

POS software is a computerised network made of software and hardware components that process and record payment transactions between a company and its customers. POS systems are widely used in restaurants and hotels. It allows for collecting guests' orders and purchases from different points of sale and charging them directly to their room or table.

Revenue Management System (RMS)

The purpose of RMS software is to improve pricing strategies in order to sell more rooms at optimal rates. RMS works to help hotels create prices for their rooms based on algorithms

The Software and devices:

In Hospitality you can find many software focused on reducing administrative tasks and cutting costs

Reputation and Review Management Software

Reputation and review management software is designed to track online users' feedback on services and products. It is a system that helps spread the customer's positive and negative reviews through the relevant online platforms.

Distribution channel manager

Channel managers are useful for all types of hotels. The function of a channel manager is to connect the hotel's inventory with multiple online channels or travel agencies. Thissoftware allows you to manage your hotel's pricing and availability across all the marketing channels you use online. A channel manager is also important to avoid overbooking

Rate shopper software

Through this software you will be able to access real time information and data about your competitors, including their prices and promotions. The benefits of using it are that it has simple graphics and is easy to use, that helps staff to optimise room rates
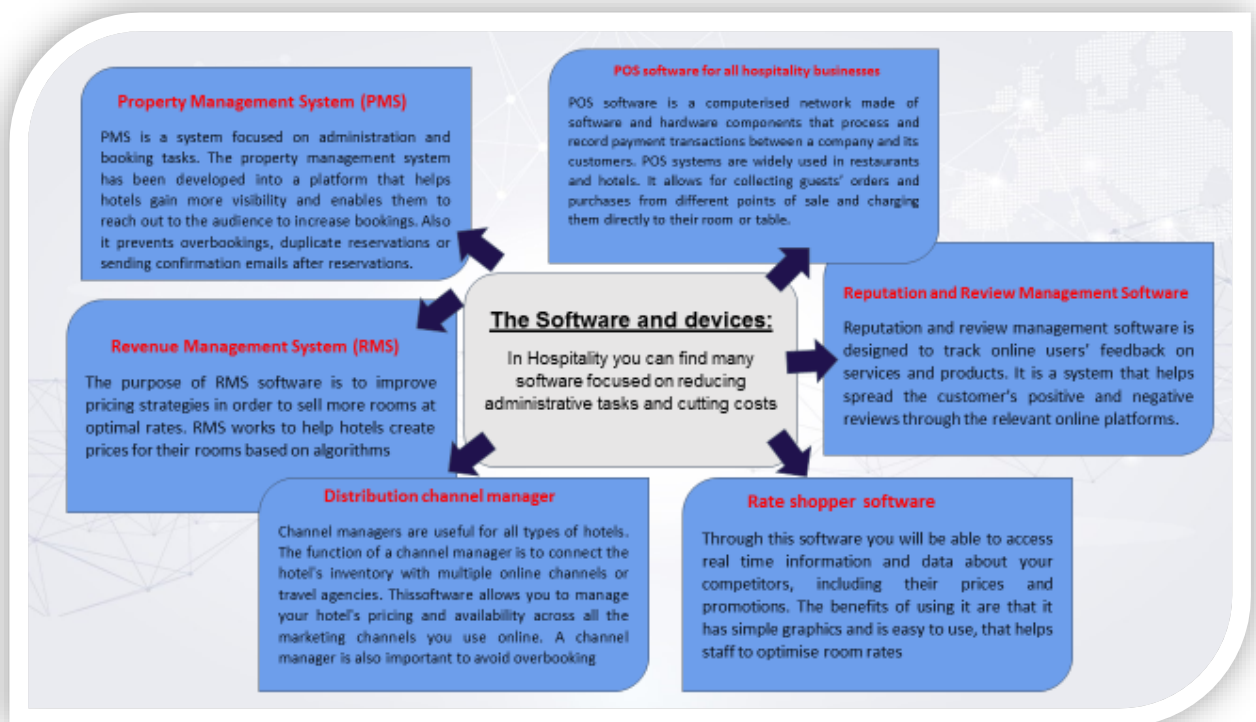
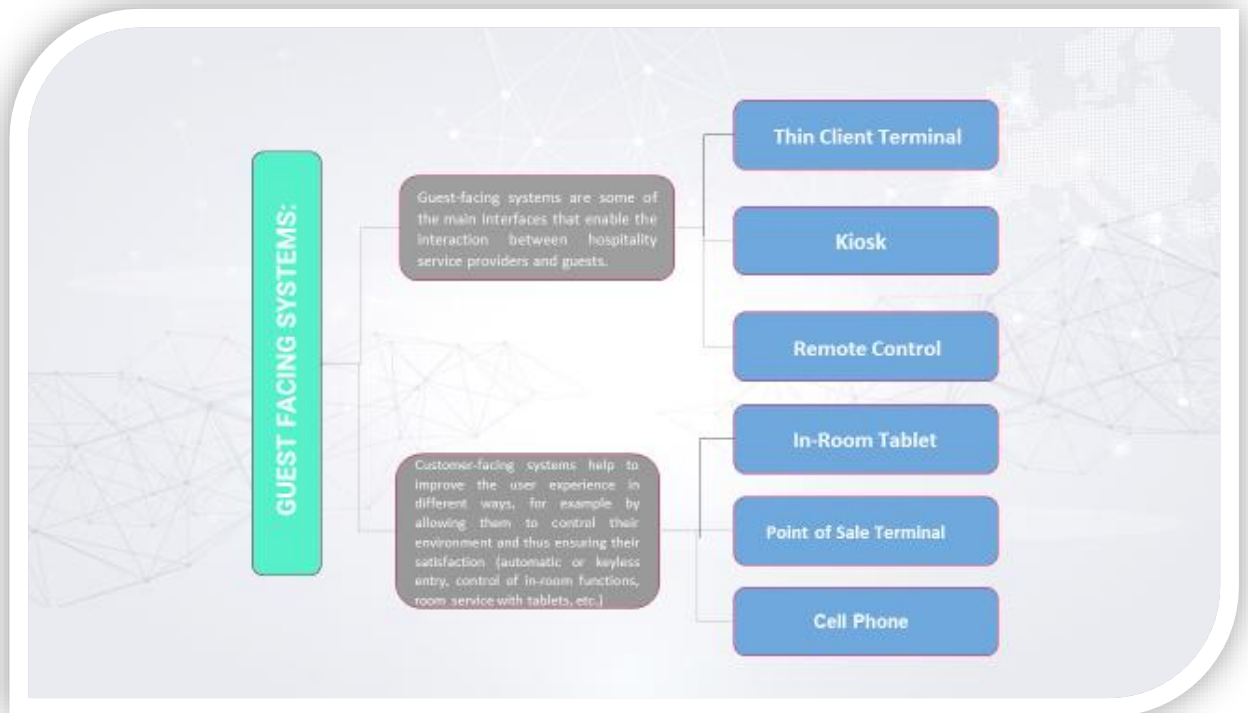*Figure 50, The Software and devices. Authors' design*
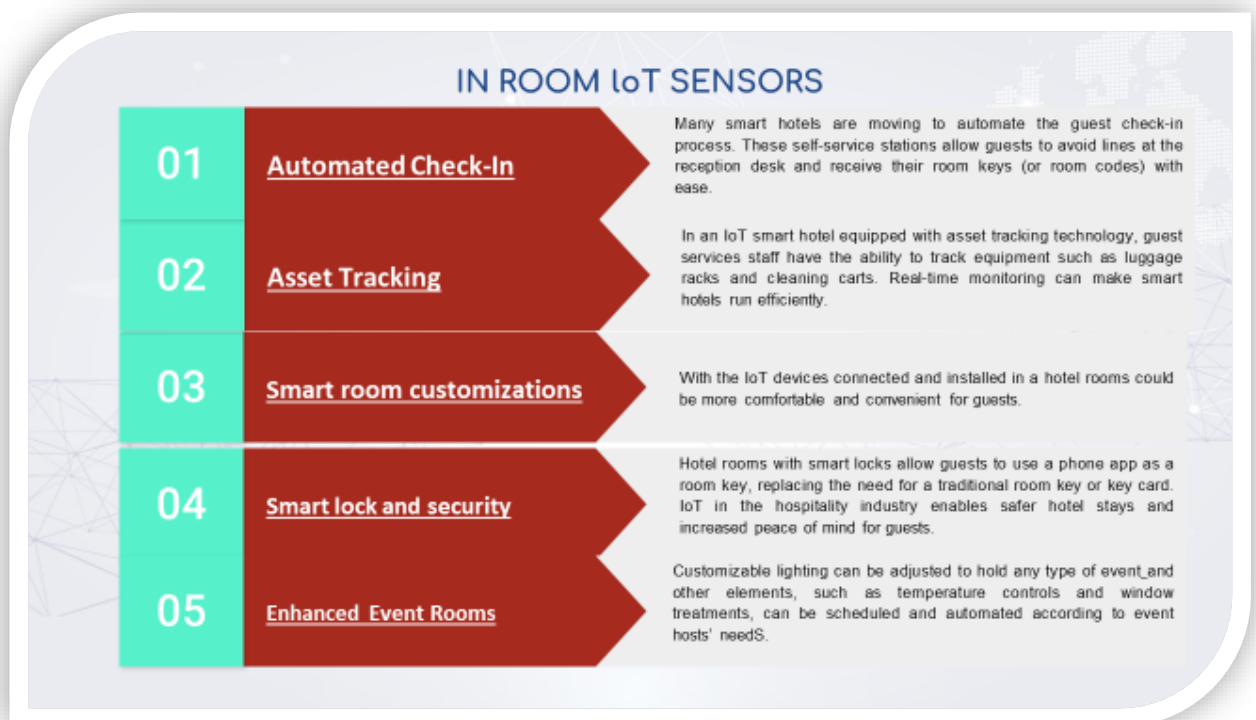
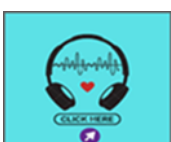Figure 51, GUEST FACING SYSTEMS. Authors' design.

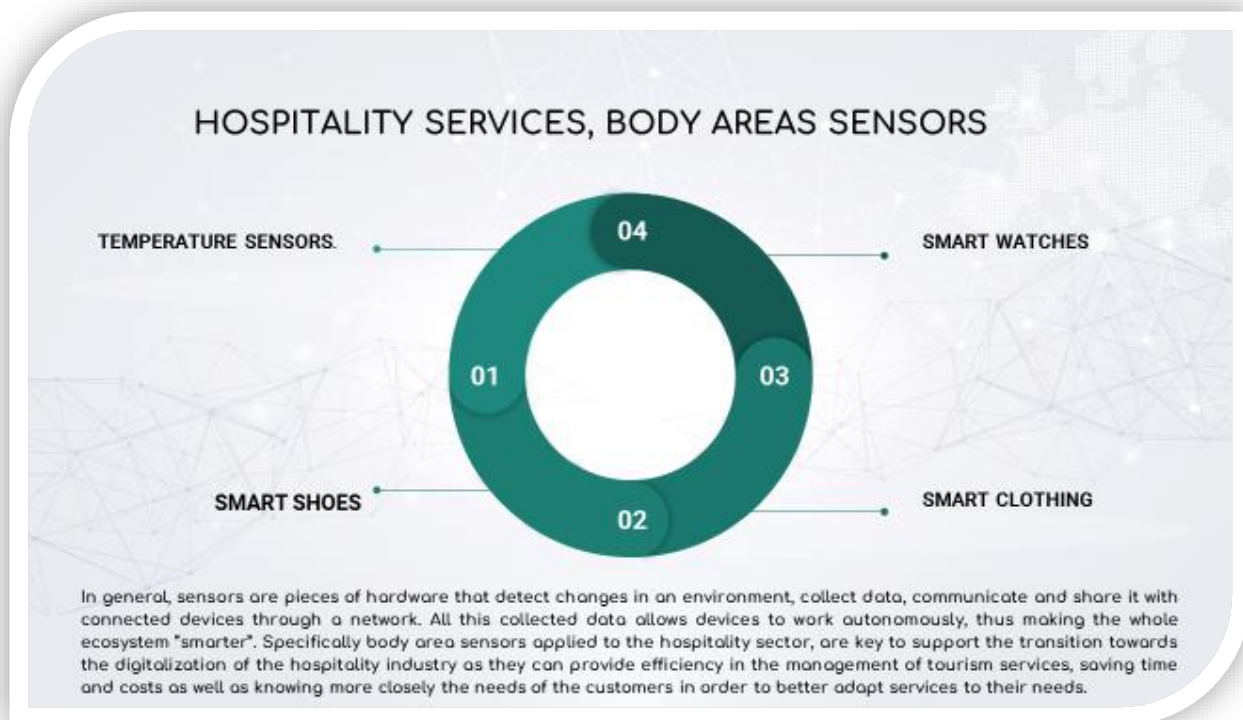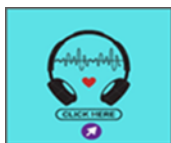Figure 52, IN ROOM loT SENSORS. Authors' design

Figure 53, HOSPITALITY SERVICES, BODY AREAS SENSORS. Authors' design

38. The Main Challenges Related to Digitalisation

In this final part of chapter 14 we will briefly touch on some of the challenges facing digitalization within the hospitality sector. This has already been touched upon in part 1 of this chapter, but in this final part we will primarily focus on the following aspects which have not been dealt with in depth before in this chapter:

• Data Management

• Security and Privacy

38.1. Data Management

Data Management

When talking about Data Management as a challenge to the digitalization efforts of the hospitality sector, we really need to start somewhere else. Namely with a discussion of the concept of Big Data which is the overall frame for the discussion on Data Management (And indeed also the topic for part 3.2 - Security and Privacy). In order to relate these two topics, we need to look at the basic characteristic of Big Data and what constitutes the term Big Data (Pahus, 2022):

1) What is Big Data? It is the conscious collection of large amount of data in order to analyze and interpret it in a given situation and for a given purpose. This is called "Volume"

2) Big Data can be more than numbers! It can be text (for example feedback from a questionnaire), it can be videos, audio and much more as long as it adhers to the definition above (conscious collection for a specific purpose). This is called "Variety"

3) A key figure of Big Data is that it is produced in real-time, and that the velocity in the creation process is quite high. This is called "Velocity"

4) Finally, Big Data is characterized by a certain amount of reliability issues and uncertainty. This is called "Varacity"

All the 4 above mentioned characteristics influence Data Management and can cause issues for the hospitality companies who has to deal with it. Firstly, there is the issue of "Volume" as this requires ample storage space at the same time as the data is collected in real-time ("Velocity"). Storing large amounts of information about guests at a hotel for example requires available storage space which can be
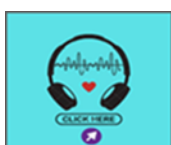
a costly affair. Additionally, this involves issues of Security and Privacy (which will be dealt with in the next subchapter) as there are strict rules and regulations concerned the storage of the personal information from the customers. This becomes even more complicated when considering the issue of "Variety" which adds to the cost of storage cost as videos, pictures and so forth take up way more storage capacity than for example numbers on a spreadsheet. Finally, there is the issue of "Varacity" which concerns the use of the data and how we can use it to for example predict future behavior.

All 4 characteristics of Big Data play a part in Data Management and influence how Hospitality companies work with the vast amounts of data they receive.
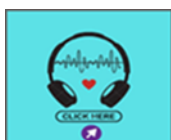
38.2. Security and Privacy

Security and Privacy

The topics of security and privacy online are essential for hospitality companies to address in order to satisfy the needs of their customers. Everyday companies in the hospitality sector process sensitive information from their customers and demands for security and privacy measures is a basic requirement.

EHL insights list several concerns when it comes to data security and privacy in the hospitality sector (EHL, 2022):

1) Reliance on Paying By Card: The hospitality industry is increasingly relying on payment by cards, and this digital transaction leads to threats from cybercriminal using malware to cipher card number ects from customers

2) High Staff Turnover: As mentioned before in this chapter concerning the labour gap, there is a high turnover of staff in the hospitality sector. This poses a threat as training and know-how is crucial to maintain a high level of data security knowledge among the staff.

3) Compliance: Especially in Europe compliance with GDPR has become essential for hospitality companies as violations of this can entail high fines and legal ramifications.

4) Insider Threats: Simply put, this entails that employees steal and sell information about the customers to outsiders. This can be everything from card number to personal information about customers preferences or other personal information.

The solution to the concerns above? In the same article as the concerns, EHL insights list the following advice on dealing with security and privacy issues:

•   Always encrypt payment card information.

•   Operate a continuous training program in cybersecurity to maintain a well-trained workforce.

•   Always adhere to relevant regulations, such as PCI DSS.

•   Use cybersecurity measures such as firewalls, network monitoring, anti-malware, and traffic filtering to protect against common threats.

•   Conduct tests against your organization's cybersecurity defenses in which you mirror the behavior of an actual hacker.

•   Know where your data is and enforce the principle of least privileges to limit access to sensitive information. (EHL, 2022)
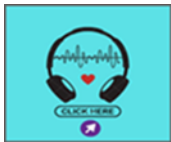
39. Statistics on Use the Digital Skills

Digital Adoption Team (2023) explored 20 of the most important statistics related to digital transformation and digital skills.

Here are a few **digital transformation statistics** that show why digital transformation matters and where it is headed: (Digital Adoption Team, 2023).

- 65% of businesses currently have initiatives to encourage collaboration between data science teams, analytics teams, and the business (Forrester)
- 62% of companies are working to embed analytic processes into their businesses in order to better automate business processes (Forrester)
- 91% of businesses are engaged in some form of digital initiative (Gartner)
- 87% of senior business leaders say digitalization is a priority (Gartner)
- 40% of organizations have brought digital initiatives to scale (Gartner)
- 51% of digital transformation efforts are fueled by market pressure and growth opportunities (Prophet)
- 70% of businesses chose to increase or maintain digital transformation spend during the pandemic (IFS)
- 58% of businesses that had not yet begun a digital transformation program said that COVID-19 has accelerated their digital plans (BakerMcKenzie)
- 76% of businesses plan on long-term IT changes as a result of COVID-19 (SWZD)
- More than a third of 2021 tech budget increases will be influenced by COVID-19 (SWZD)
- 97% of IT decision-makers are involved in digital transformation initiatives (MuleSoft)

By 2024, 25% of CIOs at large enterprises will become accountable for digital business operational results, or "COO by proxy" (Gartner)

Top strategic tech trends that will drive disruption and growth include hyperautomation, multiexperience, democratization, and human augmentation, among other things (Gartner)

These statistics clearly show that digital transformation is set to continue for the foreseeable future.

Yet another important factor that business leaders must consider when investing in digital transformation is employee productivity – and that productivity depends on having digital skills. (Digital Adoption Team, 2023).

Digital Skills Statistics: 2023 Edition

69% of employers say they prefer employees with data science skills than those without (PwC)
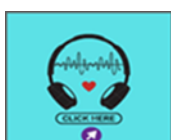
55% of employers most worried about digital skills say innovation is hampered by a lack of key skills (PwC)

Over the next five years, the global workforce can absorb around 149 million technology-oriented jobs (Microsoft)

85% of Americans believe that digital skills will be important to success in today's workplace (Pew)

54% of all employees will need significant reskilling by 2022 (World Economic Forum)

By 2022, everyone will need an extra 101 days of learning (World Economic Forum)

44% of Europeans between 16 and 74 do not have basic digital skills (European Commission)

Now that we have looked at both digital transformation and digital skills statistics, let's dive a bit deeper and understand what their implications are.

Top Takeaways and Trends

Here are a few trends and lessons that these statistics reveal:

Digital-first initiatives have become a top priority for the majority of companies, even during the pandemic. COVID-19 has fueled one of the greatest financial crises of our time. Yet it has also accelerated the need for digital transformation, which can help companies stay more resilient and profitable during such difficult times.

Digital transformation is not just profitable, it is necessary. As the economy becomes more digital and more market participants adopt digital technology, every organization will need to become digitally mature, or even digital-first. After all, participation in the digital economy requires full adoption of digital technology. Digital is becoming an integral part of every business. Over the past several years, IT has become less of a back-office function and more of an operational function. This trend should continue, and we can expect to see IT leaders play a more pivotal role in business operations and strategy.

Without access to the right digital skills, employers cannot drive transformation forward. Digital transformation depends heavily on employees' capabilities and skills. As PwC's research showed, a lack of key skills can significantly hinder business growth and innovation. The digital skills gap is widening, so companies must step up to close that gap. To ensure that employees remain proficient and productive, employers should find ways to close the digital skills gap through, for instance, employee learning programs. In short, these statistics and trends suggest that over the next several years, digital transformation will become even more important – and so will the digital skills needed to drive those initiatives.

40. Statistics on Use of the Digitalised Hospitality Technologies (F&B, cleaning, gardening, swimming pools)

The whitepaper on digitalisation in the food and beverage sector analyses the challenges of the industry and delves into the evolution of business processes through the adoption of new digital technologies. It's challenging to talk about where digitization in the food and refreshment industry is going without referencing robotization. (Siemens Digital Industries Software. (2021).

Food and refreshment producers are putting vigorously in robotization; 80% of them have in excess of 100 SKUs, and that number of SKUs is supposed to increment pushing ahead. (Siemens Digital Industries Software, 2021).

Digitalization in the food and refreshment industry is on a vertical pattern that is probably not going to shorten. The purposes and utilizations of mechanized gadgets assists organizations with keeping up with their consistence. Using large informational collections inside an association gives new open doors to development by diminishing failures and acquiring further knowledge into client needs. (Siemens Digital Industries Software, 2021).

Digitalisation in the cleaning sector" it then points at how, with the adequate support in the development of innovative training systems, the digital transition might become an opportunity to enhance professionalism and innovation in the industry. As the already rapid digital transformation of the European economy is being accelerated by the Covid-19 pandemic, the cleaning sector is no exception in this process. The ongoing digital transformation of industrial cleaning, including the development of digital tools (software, sensors and robots, internet of things exc…) are changing the way cleaning companies operate and sell their services. Upskilling and re-skilling are urgent priorities to ensure that workers and companies in the cleaning sector are adequately equipped for the challenges ahead. (Toolsense, 2023).

Reaping the benefits of digital technologies in agriculture requires the participation and cooperation of farmers, researchers, private sector, non-profits and government. Horticultural crops require more direct attention and monitoring per plant than arable crops, to ensure any emerging pests and diseases are limited to an acceptable threshold. The establishment of this intensive but integrated management approach paved the way for technological improvements that automated and optimised the farm operations that were previously performed manually, introducing more precision and reliability.

OECD work is examining the benefits and challenges of using technologies for policy in agriculture, with particular insights drawn from agri-environmental
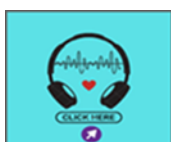
policies, and for agrofood trade. Further issues include how the regulatory environment can influence sustainable and inclusive uptake of digital technologies; how technologies might affect skills needs in the sector; and how traceability technologies can improve agricultural value chain transparency, enhance food safety and combat fraud; and potentially enable new demand-side policies to promote sustainability.

Touchpads, meet management software, heart rate monitoring, underwater cameras… all are technological advancements that have been brought to swimming. As with anything in the world, swimming has not remained a stagnant sport in terms of how it operates.

41. Statistics on use of the digital solution for the operational and administrative processes
(accounting, reservation systems, check-in systems, guest experience systems)

41.1. Guest Experiences System

Key aspects of the guest experience hoteliers want to digitalize worldwide 2021

The increasing speed of technological innovation in all industries has been a catalyst for the digitalization of the hospitality industry. In early 2021, hoteliers in Asia, Europe, and North America, were surveyed on which aspects of the guest journey they were looking to digitize later that year. The majority of respondents, 70 percent, stated that they were looking to digitize hotel information for their guests. Meanwhile, 57 percent of respondents stated that they were looking to digitize the check-in/check-out process.
How many hospitality companies are looking to digitalize?
The share of travel and hospitality companies with an individual or team directly responsible for digital transformation worldwide varied in 2020. When executives in the industry were surveyed on whether their organization had an individual or team directly responsible for digital transformation, 27 percent of respondents stated that their organization had a cross-functional team for digital transformation. Meanwhile, 16 percent of respondents, respectively, stated that
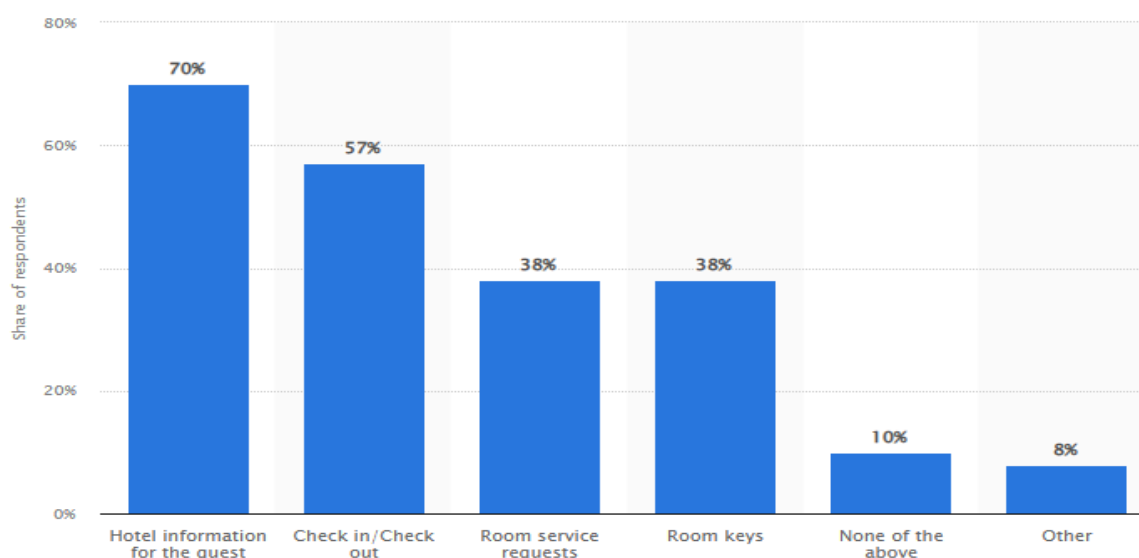
Figure 54, Source: Statista Research Department (2021)
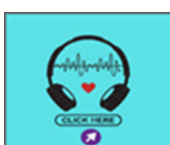
they either had a third-party partner, such as a consultant or agency, or no one responsible for digital transformation.

41.2. Reservation System

The world is changing rapidly and the travel industry is no exception. The latest statistics show that using new technology in hospitality increases online revenue by 135 percent and reduces guest complaints by 71 percent. At the same time, 81 percent of travellers expect greater digital customer service from hotel brands. To keep up and succeed in a hyper-competitive environment, hotels have to invest in technology that lets them effectively manage, control, and improve their business.

So, if you want to increase bookings, you have to reach your customers right where they are. NB: 51.4 percent of travellers under the age of 35 visited the hotel's Facebook page before booking.

41.3. Check-in System
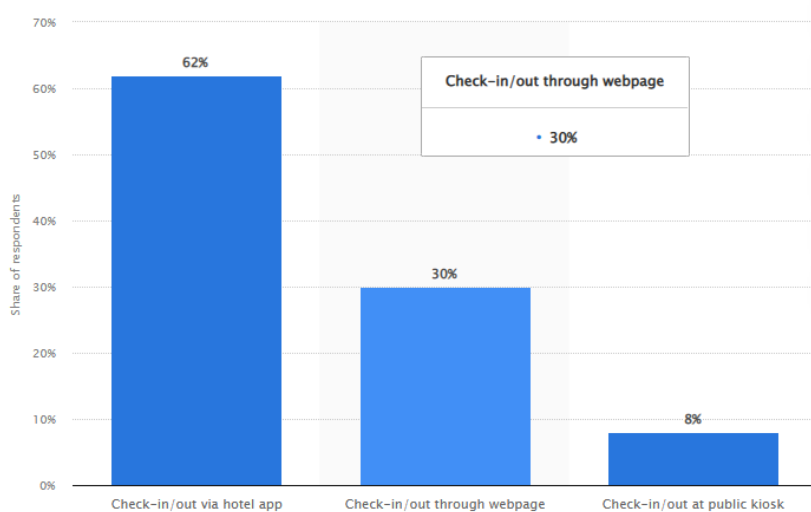
Figure 55, Source: Statista 2021

Global hotel check-in/out tech preferences worldwide 2020 did survey on the impact of digitalization solution use for check-in and check-out systems. The results of the survey indicated that a majority of respondents, 62 percent, preferred to check-in and check-out using a hotel app. Meanwhile, 30 percent preferred to use a website, leaving only eight percent of respondents who preferred to use a public kiosk. (Statista, 2021).

42. Economic Benefits from Sustainable Hospitality Digitalisation Practices

In order to achieve sustainability, digitization makes it possible to realize resilient infrastructure in every application (Narayan et al. 2022). In the context of the hospitality industry, resilient infrastructure based on digital technologies is essential for getting the best customer feedback on offering quality service. A hotel gains in numerous ways from implementing contemporary building technology. Overall, these systems improve performance, lower operational costs, and are also good for the environment.

Transportation services, traditional retail, and the hospitality sector are just a few of the industries that have been impacted by the disruption of digital technology (Prihanto and Kurniasari 2019). The hospitality industry has been impacted by the emergence of travel and lodging applications.

Figure 56, Source: Karolina Grabowska at pexels.com

If business leaders in the hospitality industry want to meet customer expectations, they must strive to alter the way they go about managing and strategizing their organizations. Supply chains are being enhanced, new markets are being entered, and productivity and efficiency are rising thanks to technology. It's new that consumer expectations are constantly shifting. The challenge for the hospitality

industry is how to adjust to these changes, how to take advantage of this chance to innovate, differentiate, and grow, and how to do all of this in a way that is efficient and leverages and optimizes the most recent advancements.

Hotel Management Software is having a great impact (Hotelogix 2022). By having a PMS (property management system) hoteliers can organize and track day-to-day operations in their hotels, making it easier for staff to run the hotel efficiently, it increases their operational efficiency greatly and are also great for the environment (this software completely negates the need for paper in your hotel). A PMS can bill guests digitally, and send digital invoices, making paper invoices obsolete. Also, confirmations or payment information is all captured digitally and stored on the PMS. Interactive hotel maps are also used widely in the hotels.

The Impact of Web-Based Booking Software is also an advantage - it allows guests to book online and select a room with ease, without any need for documents being printed which reduces paper waste. reduces individual consumers' paper waste.

Using technology such as smart thermostats, hoteliers allow guests easier access to their room's temperature controls, while saving costs on utility fees. Hotels can do away with providing guests with complimentary bottled water (a common practice) by adding tech-enabled water dispensers on their property.

Digitalization and sustainability are therefore essential to the tourism industry's survival (Easygoband 2022). Hotels need to "embrace" the new trends that are popular now, such as: tourism intelligence, big data technology, contactless solutions, business intelligence, smart tourist destinations (DTI), eco applications, smart technology if they want to achieve this.

The outcomes of digital development in previous decades have made it possible to put shared economy theories into practice (Zsarnoczky, 2018). As the shared economy grows, social well-being is given more priority as user experience gradually takes precedence over ownership. A well-managed tourism industry benefits local communities as well as business operators, making social well-being another top priority in the industry.

In the model of the sharing economy, the participants—who are also consumers—offer their surplus capacities for use by the group in order to maximize the exploitation of their products and resources. So-called hybrid transactions that can be used to the fullest extent for both commercial and social objectives make up these economic processes.
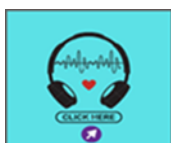
43. Climate Action Benefits from Sustainable Hospitality Digitalisation Practices

Climate change is considered one of the most serious problems faced by humanity today. Climate change is increasing and is characterized by record-breaking weather events in the form of extreme heavy rainfall, floods, and global temperature shifts with 2010–2019 the hottest decade recorded so far (Conway D, Vincent K (Eds), 2021). According to NASA (2021), the highest temperatures so far were recorded in 2020 despite a large decrease in global emissions due to the COVID-19 crisis. (Youssef, A.B., Zeqiri, A., 2022).

The new technological revolution (Industry 4.0) could help to combat climate change; how successful it will be is debatable. However, the findings are inconclusive—some studies find a positive impact of Industry 4.0 on climate change, and others find a negative or no effect. (Youssef, A.B., Zeqiri, A., 2022). Debate over the relationship between tourism and climate change (Hoogendoorn G, Fitchett JM, 2016) has been ongoing for several years. There is a strand of work on the potential effects of climate change on tourism and hospitality and the contribution of tourism to climate change [Dubois G, Ceron JP, Gössling S, Hall CM (2016), Gössling S, Hall CM (2006), Odimegwu F, Francis OC (2018), Peeters P, Dubois G (2010), Scott D, Gössling S, Hall CM (2012)]. **According to Gössling (Gössling S, 2013), this sector is considered one of the main contributors to GHG emissions. Tourism contributes hugely to carbon emissions (Adedoyin FF, Bekun FV (2020), Gyamfi BA, Bein MA, Adedoyin FF, Bekun FV (2020), which account for 5% of global carbon emissions which are due 75% to transport, 21% to accommodation, and 4% to other tourism activities (UNWTO, UNEP, and WMO, 2008). (Youssef, A.B., Zeqiri, A., 2022).**

We propose five conditions under which Industry 4.0 could help to combat climate change: first, increased use of Industry 4.0 technologies to induce increased energy efficiency and reduction of GHG from the hospitality industry; second, increased use of Industry 4.0 technologies to induce a reduction in water consumption and an increase in water use efficiency; third, increased use of Industry 4.0 technologies to induce a reduction in food waste; fourth, increased use of Industry 4.0 technologies in the hospitality industry to promote circular Hospitality 4.0; and fifth, increased use of Industry 4.0 technologies to reduce transport and travel. (Youssef, A.B., Zeqiri, A., 2022).

Proposition 1: Increased Use of Industry 4.0 Technologies to Increase Energy Efficiency and Reduce Greenhouse Gas Emissions

Proposition 2: Increased Use of Industry 4.0 Technologies to Reduce Water Consumption and Increase Water Use Efficiency

Proposition 3: Increased Use of Industry 4.0 Technologies to Reduce Food Waste

Proposition 4: Increased Use of Industry 4.0 Technologies to Promote Circular Hospitality 4.0

Proposition 5: Increased Use of Industry 4.0 Technologies to Reduce Transport and Travel

The first part of the model includes applications of Industry 4.0 technologies in the hospitality sector—CPS, the IoT, AR, VR, AI, robots, and big data. These technologies have been shown to have the potential to combat climate change in the hospitality sector. Industry 4.0 and climate change have several commonalities. They are systematic and complex and affect society. Since the technologies have the potential to increase energy and water use efficiency, reduce food waste, enable a circular model, and minimize travel and transport, we can assume that they will have a significant impact on efficient use of resources such as energy, water, food, and transport in the hospitality sector. (Youssef, A.B., Zeqiri, A., 2022).

The second part of the model shows that energy efficiency, water use efficiency, food waste reduction, and circularity are linked. First, implementation of circular Hospitality 4.0 will have a significant effect on increasing energy and water use efficiency and reducing food waste. Circular hospitality will also reduce costs. Application of the new technologies is making it possible to reuse and recycle resources, which reduces waste and costs and increases efficiency. At the same time, Industry 4.0 technologies help to reduce carbon emissions and are less damaging to the environment. Second, reducing food waste will increase energy efficiency and water use. Food, energy, and water are linked, and the more food that is produced and prepared, the more energy and water is consumed. Use of technologies to reduce food waste would increase water and energy efficiency. Third, more efficient water use will have a significant influence on increasing energy efficiency. (Youssef, A.B., Zeqiri, A., 2022).

Finally, all of these aspects will enhance business performance. The potential of Industry 4.0 technologies goes beyond combating climate change and enhances business performance by reducing energy, water, and food waste costs. In addition to circular Hospitality 4.0 and reduced travel and transport, this will reduce GHG emissions hugely. (Youssef, A.B., Zeqiri, A., 2022).

The link to the Model: (Youssef, A.B., Zeqiri, A., 2022). Retrieved from https://link.springer.com/article/10.1007/s43615-021-00141-x/figures/2
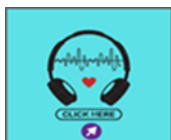
44. Technological Progress from Sustainable Hospitality Digitalisation Practices

Within the scope of Hospitality industry digital technologies are essential in supporting the activities of many subsectors. (Naikoo, 2022) The hospitality industry makes extensive use of technology to address issues including operational efficiency, unsocial working hours, and labour expenses. In this customer-focused and fiercely competitive market, technologies have become essential components of both operations and strategic management. (Leung, 2021)

The first automatic hotel reservations system established in the 1950s. International hotel chains created central reservation systems of their own to facilitate cross-border hotel bookings. Operation-oriented programs and guest-operated in-room equipment were important in the decades before to the internet era, but connecting them needed expensive, specially developed proprietary interfaces. Wider distribution and more price transparency were made possible by the internet. One of the most difficult duties for revenue managers is managing a lot of internet outlets. Search engine positioning has an impact on how competitive hotels are. Modern methods of managing the reputation of hotels have been altered by electronic word of mouth. (Leung, 2021)

Nowadays technological advancement has played significant role in hospitality industry development as consumer behaviour has also changed. Innovations are crucial in the hospitality industry to boost productivity, promote guest loyalty and enhance efficiency (Elkhwesky, El Manzani, & Elbayoumi, 2022). Covid-19 pandemic has boosted technology development in hospitality industry and changed the way how processes are organized within hospitality industry irreversible. One of challenges for tecnological progress implementation within hospitality industry is differences between chain and indepedent enterprises. For chain enterprises are more resources to create, explore and later on implement developed technologies in reality.

Hospitality industry these days is impossible without contactless payments, mobile keys, chatbots, virtual reality, recognition technologies. These technologies are demanded by consumers, that is part of new reality. In a foreseeable future in hospitality industry service given by humans will be exclusive.
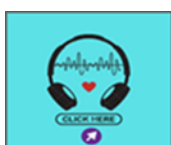
45. Review and Summary on Worldwide Developments in Sustainable Hospitality Digitalisation: the World

For innovative enterprises, the efficiency of interactivity is of key importance for the success of their business. The rapid development of ICT solutions has brought immense changes in the tourism industry. Previously, consumers' decision making was mainly affected by the industrial environment. The era of digital tourism spaces – preceded by theme parks and thematic destinations – started with the emergence of information websites; however, this targeted information flow used to be one-directional with narrow choices. In today's digital era, the new generation of commercial activities take place in VR or AR spaces, and the instant analysis of the customer's reactions and behavior support the enhancement of their buying willingness. The traditional decision making processes are gradually being replaced with personalized offers, further increasing the importance of AI. (Zsarnoczky, M., 2018).

> **With the development of shared economy, greater emphasis is put on social well-being, as user experience slowly becomes more important than ownership. This new approach is also expressed in novel forms of payment, which can seriously decrease the profits of intermediate activities. The new trends do not seem to be problematic in the tourism industry, mostly because in this sector, the exact costs and incomes are not clearly visible yet. On the other hand, the quality development of the 3D printing technology holds a great opportunity for the tourism and hospitality sector. The development of digitalization has finally reached a level where it can truly support the cost-effectiveness and sustainability of industrial food production, paving the way to the future of tourism and hospitality businesses. (Zsarnoczky, M., 2018).**

In previous decades, the results of digital development have opened the door for the real life implementation of shared economy theories. It was almost ten years ago that Chris Anderson (2009) introduced his pricing theory in digitalization, basically suggesting giving away products for free, based on the principle of shared goods and resources. Although at the time Anderson's theory was considered as a technological solution, the principle of digital sharing have induced serious social changes as well. One of the most important positive messages of shared economy is the maximum use of resource capacities for the purpose of social well-being (Sundararajan, 2014). (Zsarnoczky, M., 2018).
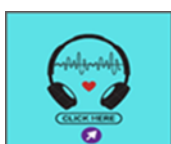
According to the forecasts of product development strategies in various industries, almost all of our everyday objects and equipment will be accessible through the internet in the future. As a result, all devices that are capable of two-way communication will belong in the framework of IoT (Internet of Things). The devices of the future, unlike the devices of today, will communicate in a bidirectional way, where robust safe data handling, personalized differentiation and sufficient decision management will be part of the user experience. As a result of the continuous data collection during the use of these devices, all relevant information will eventually end up in a final centralized system at the top of the dataset. (Zsarnoczky, M., 2018).

The newest technological developments and the innovation in the use of living spaces are all connected to the alternative payment options that can be used in tourism as well. The emergence of Bitcoin and other cryptocurrencies has led to the creation of a novel payment system. The Blockchain payment system is a shared database, which records a continuously growing list of data blocks, preventing any counterfeiting or alteration of the data. One block consist of a list of transactions and the results of computations made by the stored programs. For example, if a customer buys some cryptocurrency or any other kind of currency, and then transfers it to anywhere in the world to another partner, who exchanges it instantly, both partners can avoid any loss caused by exchange rate fluctuations; furthermore, the whole transaction takes only minutes instead of the usual couple of business days. This solution can mean a revolutionary innovative payment option for everyone in the tourism industry. (Zsarnoczky, M., 2018).

The applicability of the blockchain system is independent from currency rates. In the case of cryptocurrencies, it is not the exchange rate that really matters – instead, the true value of the currency lies in the safety of the blockchain technology and in the authentic, transparent, unalterable and decentralized recording system (Pilkington, 2016). This payment system offers a new level of encryption safety and intervention-free operation, and the data handled in the system cannot be modified in any way. Another huge benefit of the system is that the transactions are realized without any intermediate agents, thus eliminating any additional transaction costs. By the time of the "maturity" of blockchain payment solutions, today's large service intermediators like Airbnb, Booking.com, Agora, etc. are foreseen to lose some of their market positions, as consumers and service providers will probably deal with their transactions directly. (Zsarnoczky, M., 2018).
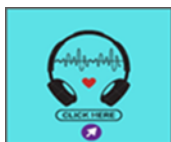
46. Review and Summary on Regional Developments in Sustainable Hospitality Digitalisation: the European Union

46.1. Smart Tourism initiative

The European Capital of Smart Tourism initiative recognises outstanding achievements by European cities as tourism destinations in four categories: sustainability, accessibility, digitalisation as well as cultural heritage and creativity. This EU initiative aims to promote smart tourism in the EU, network and strengthen destinations, and facilitate the exchange of best practices.

The European Commission is implementing the European Capital of Smart Tourism initiative. Currently it is financed under the COSME Programme and it is a successor of the Preparatory Action proposed by the European Parliament. The initiative aims to:

Promote: Promote the rich tourism offer of European countries and increase citizens' sentiment of sharing local tourism-related values.

Strengthen: Strengthen tourism-generated and innovative tourism development in the cities, their surroundings and their neighbour regions.

Increase: Increase the attractiveness of European cities that are awarded the title and strengthen economic growth and job creation.

Establish: Establish framework for the exchange of best practices between the cities and create opportunities for cooperation and new partnerships.

Inform: Inform the travellers of the sustainable and outstanding tourism practices in destinations they are visiting.

Encourage: Encourage sustainable socio-economic development in tourism destinations across Euro. (EC, 2022).

For the purpose of the European Capital of Smart Tourism competition, the cities were invited to describe and share their innovative projects, ideas and initiatives implemented under each of the four award categories **(Accessibility, Digitalisation, Sustainability, Creativity & Cultural heritage)** which helped them to improve their profile as a tourism destination. Therefore, **being sustainable** does not only mean to manage and protect your natural resources as a city, but **to reduce seasonality and include the local community. Digital tourism means offering innovative tourism and hospitality information, products, services, spaces and experiences adapted to the needs of the consumers through ICTbased solutions and digital** tools. It is about providing digital information on destinations, attractions and tourism offers as well as information on public transport and making attractions and accommodation digitally accessible. (EC, 2022).
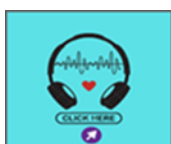
46.2. Digital Guest App

DigitalGuest www.digitalguest.com is the most powerful personalized guest experience web app that enables hotels to maximize revenue, reduce prints and automate communication throughout the whole guest journey.
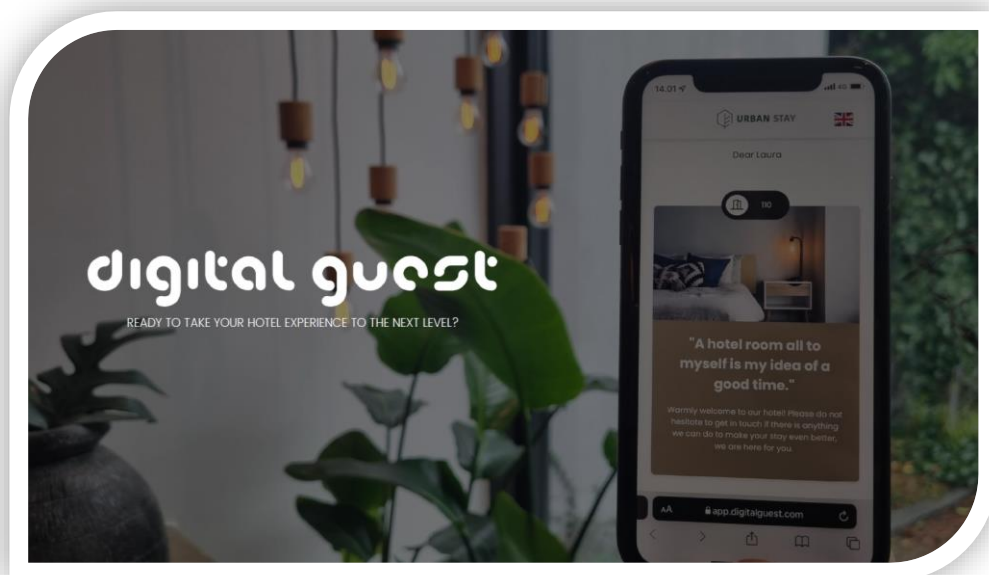
Figure 57, Digital Guest

We help hotels to improve guest satisfaction, by offering communication with their guests already before the stay with a personalized welcome message. It's possible to customize and target emails and SMS flow based on room type, rate code, or guest profile and offer special deals, such as room upgrades, parking services, and breakfast packages.

The guest can access all the information about the hotel, contact reception, and order room service directly from their own smartphone. This allows guests to spend more time enjoying their stay, rather than worrying about finding the wi-fi password or breakfast time.

The platform is fully integrated into different PMS systems, meaning that the whole guest journey from pre to post-stay is fully automated. Overall, DigitalGuest enables you to share valuable information with your guests and increase your revenue from existing customers through our digital platform. Our system will take your hospitality to the next level through personalized upselling, unique guest insights, digital room service, and online communication with your guests.

47. Review and Summary on Regional Developments in Sustainable Hospitality Digitalisation: Cyprus

In the middle of three continents, Europe, Asia and Africa, Cyprus became a well-known destination for tourists. Its desirable healthy climate and the numerous golden beaches combined with the 10.000 years old history, is an adventurous destination to a wide variety of tourist market of all ages and classes. Being at a position where trade and the hospitality as continuity took place, the inhabitants gained the professionalism and experience that needed to become expert in accommodating excellent service to the visitors.

Cyprus is a small island-country which since 2004 and 2008 has joined European Union and Euro area respectively. It is a country that has showed remarkable resilience and was able to come back strong after the economic downturn of 2008 and the crisis of 2013. Since 2015, Cyprus has made an impressive recovery, experiencing some of the fastest economic growth in the EU over the past five years. GDP growth has averaged 4.5% per annum, compared to a EU27 average of 1.7% per annum (Cyprus Recovery and Resilience Plan, 2021). But one of the long-standing challenges of the Cyprus economy is that the economic growth has been reliant on specific sectors: construction, real estate services, travel and tourism, and wholesale and retail trade make up 70% of the country's GDP.

The island attracted almost 4 million tourists in 2019 and brought revenue of €2.683 billion (Cystat, 2022), which was a slight increase of 1% comparing to a year prior. The sector contributes about 20% to the Gross Domestic Product (Deputy Ministry of Tourism 2019).

If we compare the increase in arrivals and the slight decrease in revenues (-1%) we clearly see that Cyprus is facing a problem of competitiveness and lacks the capacity to attract wealthier visitors. Cyprus is a mature destination that needs to reposition itself on the world tourism map and manage its resources in a more sustainable way. Part of the answer to the above issue can be digitalization of the economy and consequently of the hospitality sector and sustainable development. Authorities plan to use the Cyprus Recovery and Resilience Plan 2021-2026 to invest heavily in the digitalization of the economy and turn Cyprus into a Green destination.
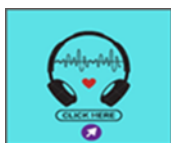
47.1. Sustainability practices in Cyprus

The hotel industry is continuing its impressive growth with more than 16 new ones are scheduled to open within 2022 and the coming years throughout the island, including luxury, high-end, boutique and casino hotels (Inbusiness, 2022). Sustainability is an issue that was in the agenda of the hospitality industry stakeholders for many years now but it is still an issue that it is either in its infancy stage, or, not very well communicated (Efthymiou et al., 2022). Cyprus as part of the European Union since 2004 has set ambitious targets to reach 32% green energy by 2030 (European Parliament, 2017).

In this context the Cypriot Hotel Industry has introduced a number of initiatives in its attempt to become greener and more sustainable and also improve its competitiveness and efficiency. Energy efficiency is a top priority especially in this high energy cost era that we are going through. Heating and cooling systems, linking with room occupancy and use. Lighting is also a large energy-using system in hotels and is probably the easiest to address. Some of the priorities and initiatives that are under way are the following:

• Greenhouse gas emission reduction and adaptation;

• Effective liquid and solid waste management;

• Protection of water resources;

• Maintaining and enhancing biodiversity;

• Enhancement of resource efficiency;

• Transition towards green economy and green labor market and

• Integration of environmental dimension into developing activities

(source: Ministry of Foreign Affairs, 2017)

There are though, problems to implement the above policies that originate mainly from the economic aspect and the local culture. In particular, many businesses, including hotels, face problem in capital access and therefore they cannot afford to invest in greener technologies (Malindretos et al., 2014). Furthermore, there is limited information and training on environmental issues and many still believe that it is the job of the government to address the environmental challenges. But increasingly there is a realization that if their companies do not   become more sustainable they will lose their customer base (Efthymiou, L. et al., 2022).
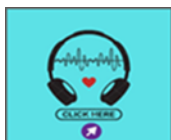
47.2. Digitalization challenges in Cyprus

The digital transformation of the Cypriot tourism sector is progressing rapidly but remains below the EU average on the Digital Economy and Society Index that European Union makes public every year (kathimerini,2022). Cyprus falls behind the target of EU to reach 75% of companies by 2030 to use cloud services and digital intelligence. At the moment only 3% of Cypriot companies use AI technologies, while one in three use the Internet. Still this a higher that the European average. Cypriot hotel companies have much to gain from the introduction of digitalization since they can offset many disadvantages that originate from their small and medium size.

Digital marketing communication and sustainable development can help them to improve their public image and their access to a public audience. Digital technologies can be used also to raise awareness for the sustainability initiatives that are under way or are in the making. Hotel companies can promote the green projects they are doing and build awareness for the sector. Cyprus is already in a good place to compete and promote itself as a green destination since it has won awards for its beaches and clean environment (e.g. award for top 100 green destinations for Paphos in 2022).

Local authorities and the industry leaders are aware of the importance of the digital transformation. Mr Loizidis the president of the Cypriot Hotel Association has pointed out that "Digital transformation and innovation should be viewed as a priority in a country for which tourism is a basic pillar of growth" (stockwatch, 2018). He claimed that tourism can contribute to viable and sustainable development making the connection between sustainability and digital transformation. There are efforts to invest in digital skills and new technologies to offer high-quality digital services. The 'Digital Tourism Adviser is part of the 'dTour' project funded by the Erasmus+ programme of the European Union. The dTour project is such an initiative by the EU to support tourism and hospitality companies to provide high-quality digitalized services to small and medium-sized businesses with focus on hotels and accommodation.
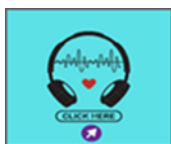
48. Review and Summary on Regional Developments in Sustainable Hospitality Digitalisation: Italy

In recent years, after the dark period of the global economic crisis, it has been noted that the trend of demand and supply of tourist services has considerably recovered, and the growth rates of the sector mark a substantial increase year after year. In a certain sense, the market is exploiting the many possibilities offered by new communication systems and increasingly innovative services. Technological innovations, therefore, mainly intervene in tourism production in the sense of: 1) allowing an optimal operating level, through digitization of data and information to connect all the relationships in charge of the entire value chain; 2) allow the company to enter its business environment in a competitive manner. The implications connected with these two points are revealed in the complexity of the tourist system and in the multidimensionality of the effects produced on the economy and on society. From the point of view of digitization as a significant aspect of every management and information exchange activity, it can be seen that tourist businesses today mainly have to deal with a changed attitude of customers, who have changed orientations and habits, above all as regards the choice of tools to be used to direct one's stay. Indeed, it is well known that the more individuals are able to use digital means made available by the WEB, whether they are general or sectoral search engines, or the social networks themselves, the more companies in the sector have to fit into this system competitive and offer increasingly sophisticated communication services to those potential customers.

From the data and trends analysed in this book, emerges that it is impossible to talk about tourism and travel without talking about digital innovation. When we talk about the "digitalization of travel" and Digital Innovation in Tourism, we are referring to all that set of service and process innovations that have an economic-organizational impact on the activity of tour operators.

The competitiveness of the sector in Italy is in fact increasingly influenced by the use of digital technologies, both in the relationship with the tourist and in the management of services. Digital tourism is therefore defined within these areas: the new needs of the tourist, the spatio-temporal extension of the journey, the different ways of interacting between the actors and the integration of experiential tourist services.

Among the reforms and investment plans envisaged by the PNRR (National Recovery and Resilience Plan), renamed the "Italy Tomorrow" plan, there are several that provide benefits for companies operating in various sectors, including
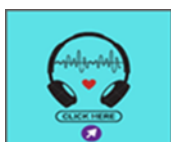
tourism. An ambitious plan that will have economic resources of over 191 billion euros available, financed through the Recovery and Resilience Facility (RRF), as part of the EU Next Generation programme.

In addition to another 30.6 billion euros of national resources, which flow into a special complementary fund financed through the budget deviation approved by the Council of Ministers last April and subsequently authorized by Parliament. A total of around 222 billion, to which are also added the 13 billion of the Recovery Assistance Package for Cohesion and the Territories of Europe (REACT-EU).

Digitization and other strategic axes

These funds will finance a series of interventions that revolve around three strategic axes: digitization and innovation; ecological transition; social inclusion. Going into more detail, the PNRR is divided into sixteen components, grouped into six missions:

- Digitization, innovation, competitiveness and culture.
- Green revolution and ecological transition.
- Infrastructures for sustainable mobility.
- Education and research.
- Inclusion and cohesion.
- Health.

Towards an innovative tourist offer

As far as the tourism sector is concerned, the "Italy tomorrow" plan provides for a series of investments to enhance accommodation facilities and tourist services. By increasing the competitive capacity of businesses and promoting a tourist offer based on environmental sustainability, innovation and the digitization of services. Also by adopting new work organization models which will also be supported by training courses to strengthen the digital skills of operators in the tourism sector. Furthermore, an attempt will be made to fully exploit the potential of the major events that will affect the country, including the 2025 Jubilee, creating alternative and integrated routes towards all regions.

The action tools used will consist of:

– in a tax credit for accommodation facilities so as to increase the quality of tourist hospitality through direct investments in environmental sustainability (renewable sources with lower energy consumption), in the redevelopment and increase in the quality standards of Italian accommodation facilities even under the profile of digitisation;

– in the creation of a "Special Tourism Section" of the Central Guarantee Fund in order to facilitate access to credit for entrepreneurs who manage an existing business or for young people who intend to start their own business.

– in incentives for the aggregation of tourism businesses;
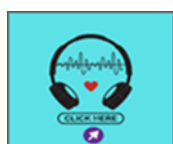
– in a strengthening of the National Tourism Fund for the redevelopment of properties with high tourist potential and iconic hotels in order to enhance the identity of Italian hospitality of excellence and encourage the entry of new private capital;

– in a strengthening of the EIB Fund for sustainable tourism (the Fund can raise capital through participation in initiatives of European financial institutions to grant subsidized loans to the tourism sector);

– in the participation of the Ministry of Tourism in the capital of the National Tourism Fund, creating a fund of real estate funds with the intention of purchasing, renovating and requalifying Italian hotel structures (1,500 hotel rooms), protecting strategic and prestigious real estate properties and supporting the recovery and growth of hotel chains operating in Italy, especially in the southern areas.

As has been repeatedly underlined, even on the part of the institutions, there is an increasing awareness that the measures in support of the interventions for the digitization of companies go hand in hand with those in support of energy efficiency. Also because both technologies are able to provide the best results in terms of productivity improvement and consumption reduction, when they are integrated with each other.

49. Review and Summary on Regional Developments in Sustainable Hospitality Digitalisation: Latvia

Latvia is a strong advocate of the Agenda 2030 on the Sustainable Development Goals (SDGs). As a member of the UN Economic and Social Affairs Council (ECOSOC), Latvia promotes the need to accelerate the implementation of the 2030 Agenda and highlights the sustainable development related issues such as climate action and digital cooperation. Latvia presented the first voluntary national review on its SDGs achievements at the 2018 UN high-level political forum on sustainable development. Latvia is a member of the UN Group of Friends of Voluntary National Reviews.

At national level, sustainable development actions are integral part of Latvia's National Development Plan 2021-2027. More information available at the website of the Cross-Sectoral Coordination Centre of the Republic of Latvia.

49.1. Green Tech Cluster

Green-Tech Cluster or Green and Smart Technology Cluster is organization developed for cross-sectoral cooperation bringing together companies, educational and research institutions, as well as other organizations that partly or fully operate in the industries of green and smart technologies. The cluster includes industries important to the sustainable development of Latvia, which also are priority sectors of smart specialization strategy: mechanical engineering and engineering, information, and communication technology and space technology, energy-efficient buildings, efficient production and environmentally-friendly raw materials. This synergy ensures efficient use of available resources and allows to achieve the most efficient development of Latvian economic environment. Cluster brings together one of the fastest growing companies with a significant share of exports and potential for development of the Latvian economy in priority sectors.

49.2. HOSPITALITY SOLUTIONS: DEDGE IN LATVIA

D-EDGE Is the European No1 and World No3 hotel distribution technology provider in hospitality.D-EDGE was created as a merger of two of the largest independent hotel marketing technology companies, Availpro and Fastbooking, under the supervision of one of the most innovative hotel chains in the world.

D-EDGE offer solutions for:

CENTRAL RESERVATION SYSTEM

- Booking Engine
- Channel Manager
- Central Inventory
- GDS Solutions
- Payment Solutions

CONNECTIVITY HUB

- PMS Connectivity
- RMS Connectivity
- Distribution Connectivity
- Payment Connectivity
- CRS Connectivity
- CRM Connectivity

DATA INTELLIGENCE

- Price Monitoring
- Price Recommendation
- Performance Analysis
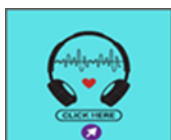
WEBSITE CREATION

- Website Development
- Content Creation
- Media Production

DIGITAL MEDIA

- Search Marketing
- Display Marketing
- Social Marketing
- Metasearch Marketing

GUEST MANAGEMENT

Central Data Management Platform

50. Review and Summary on Regional Developments in Sustainable Hospitality Digitalisation: Spain

The hospitality sector is key to Spain's economy and culture, but it is also one of the hardest hit by the pandemic.

In relation to advances in digitalisation in the hospitality sector in Spain, the Spanish Federation of Hospitality and Catering in its annual survey on the sector, states that 81% of restaurants and hotels in Spain have a presence in social networks and almost 76% have a website. These figures show that the Spanish hospitality sector is currently in an advanced position in terms of digitisation.

According to the Digitisation of the Hospitality Industry Study carried out by Hostelería de España, together with four of the sector's main suppliers: Coca-Cola, Mahou San Miguel and Pernod Ricard España. The results show that as a result of the pandemic, the data on employment, establishment numbers and turnover worsened considerably.

The study also concludes that digitalisation is a key tool for the sector today and that the main motivations for the hospitality industry to go digital are focused on reactivating demand, while the main barriers are, for more than half of the hoteliers, especially in bars, cafés and restaurants, the lack of budget and lack of knowledge and adequate training.

Digital tools and the revolution brought about by apps on mobile devices have also changed users' perceptions of hotels and restaurants.

Hotel and restaurant establishments are currently facing a digital challenge in Spain, adapting to both online reservation management systems and online reputation-based systems. In addition, just over half of hoteliers and restaurateurs are listed in online reputation systems and the following figure should be taken into account: 60% of users who book a restaurant with an app leave a review.

These systems are well known to everyone. In the hospitality sector we find sites such as booking (one of the most widely used in Europe and the United States), Expedia and Trip Advisor.

The restaurant sector has also undergone major changes in recent years. When we talk about digitalisation, we are not only talking about applications dedicated to making reservations from a mobile phone or computer, but also about home food delivery or special offers and automated management programmes that focus both on customer relations and on transforming business operations. The most successful digital tools in Spain among businesses are above all those pertaining
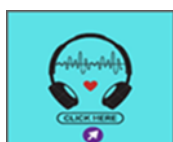
to direct dealings with customers (payment methods, wifi network, QR code letters).

According to a recent study carried out by Conectadhos, a platform led by Hostelería de España and made up of the main supplier brands in the sector, the degree of digital maturity in the hotel and catering sector is low, standing at 4.48 out of 10. 60% of those surveyed invest at least 1% of their turnover in tools or initiatives to digitilise their businesses, and a high percentage express an interest in going digital, but the main problem is a lack of budget.

Faced with this situation, Hostelería de España is committed to providing companies in the sector with access to Kit Digital, which seeks to minimise the barriers between levels of digital maturity, achieving a structural and competitive transformation, through the implementation of the Next Generation Funds.

In terms of sustainability, according to an article in the Spanish magazine Hostelería Digital, Spain produces 7.7 million tonnes of food waste, of which 12% is generated by the hospitality sector (840,000 tonnes), far below other links in the production or consumption chain, such as households, where 53% of waste is produced, or the agri-food industry, with 19% of waste generation.

The Sustainability Cluster organised by the Spanish Hotel and Catering Industry also analysed the sustainable future of the hotel and catering industry, focusing on three specific aspects of the broad spectrum of actions that can be taken: the reduction and management of plastics, the reduction of food waste and decarbonisation.

Another important aspect to highlight about the sustainability of the Spanish hospitality industry is that it is leading the fight against climate change within its sector through a pioneering initiative in the world that allows bars and restaurants committed to the environment to reduce the impact of their activity by reducing emissions. Hostelería #PorElClima, launched in 2017 by Ecodes and Coca-Cola, with the strategic collaboration of Hostelería de España, is a virtual platform that helps restaurateurs by providing them with information to help them achieve their goal of becoming more sustainable spaces and reduce their carbon footprint.

According to Hostelería de España, "sustainability and the reduction of the carbon footprint are among the priorities of the sector in the immediate future. The hotel and catering industry has to assert its important social weight, since in addition to the impact of the direct actions that can be carried out by the 300,000 hotel and catering establishments in Spain, there is also the multiplier effect that the visualisation of these small actions can have on the millions of customers who visit hotel and catering establishments on a daily basis".

51. CASE STUDIES of Sustainable Hospitality Digitalisation: Italy

Tourism, in its economic sense, is among the most important industries in the world. This is obviously true for Italy, first of all for its impact on GDP and employment, and secondly, in terms of entrepreneurial contribution, an aspect perhaps less considered: there are in fact hundreds of thousands of small entrepreneurs and operators in the sector who contribute to creating well-being in the tourist areas of which the country is rich.

Before the health crisis, tourism accounted for 13.2% of the national Gross Domestic Product (equivalent to over 232 billion euros) and represented 14.9% of total employment, totaling 3.5 million employees. (Source ISTAT)

With the onset of the emergency, the impact of the tourism sector on the fall in GDP was very strong. Just think of how the Tourist Added Value (VAT) directly generated by visitor demand stopped, in 2020, at 67.6 billion euros (4.5% of total value added and 4.1% of GDP), a whopping 63.7 billion euros less than in 2019.

Tourism and PNRR, what does the Plan provide for?

Precisely because of the importance of Tourism for the Italian economy, the sector is at the center of an important reform plan within the National Recovery and Resilience Plan (so-called PNRR). In particular, Mission 1 of the plan, entitled not by chance 'Digitalisation, Competitiveness, Culture and Tourism'. The Mission provides for the allocation of EUR 2.4 billion in favour of a strategy to support and relaunch tourism based on the enhancement of cultural and tourist heritage and digitalisation. Among the interventions planned in the five-year period 2021-2026, are the creation of a digital tourism hub and a series of integrated funds to boost business competitiveness.

From the data and trends analyzed in this book, it emerges how impossible it is to talk about Tourism and Travel without talking about Digital Innovation. When we talk about 'digitalising travel' and digital innovation in tourism, we are referring to all those sets of service and process innovations that have an economic-organizational impact on the activity of tour operators.

The competitiveness of the sector is increasingly influenced by the use of digital technologies, both in relations with tourists and in the management of services. Digital tourism is therefore defined within these areas: the new needs of the tourist, the space-time extension of travel, the different modes of interaction between the actors and the integration of experiential tourist services.
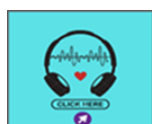
So what are the main digital solutions at the service of tourism? As in other industry, data valorisation is also becoming central in tourism and the cultural sector in order to collect, manage and use data in a strategic way. In this context, cybersecurity and data protection solutions also emerge, which are now essential for any business. Contactless solutions are also becoming increasingly numerous, especially accelerated by the need for social distancing, for example: mobile payment options (Apple Pay, Google Pay) or remotely (Pay-by-link), home automation devices, virtual assistants or self-check-in systems.

Channel Manager. A tool for integrating the different online distribution channels that allows each room of an accommodation facility to be put up for sale simultaneously on all the channels with which the structure is connected.

Buy Now, Pay Later. Service that allows you to buy something, often online, and pay later in a lump sum or in installments, thanks to short-term financing without interest.

Marketing Automation. Software that allows you to automate repetitive online marketing tasks such as tracking website visits.

Dynamic Packaging. Method used in holiday package bookings. Allows travelers to build their own package (flight, accommodation, and car rental) instead of buying a predefined one.

Revenue Management System. System used to analyse customer demand, in order to optimize inventory and price availability by maximizing revenue growth, identifying the best pricing strategy.

Customer Relationship Management. A tool that supports collecting contacts and managing all of a company's relationships and interactions with current and potential customers.

Central Reservation System. Reservation management software across distribution channels used to update and store inventory and pricing information.

Business Intelligence Systems. Tools that analyse current and historical data to make better decisions and implement more efficient business processes.

Property Management System. Tools to manage room planning, check-in and check-out, staff and accounting.

Booking Engine. Digital direct booking management tool via the property's website.

Open Marketplace B2b. Marketplace that allows accommodation facilities to sell a service to travel agencies without additional intermediaries or agreements.
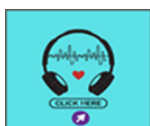
52. Case Studies of Covid-19 effects on Sustainable Hospitality Digitalisation

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States, across five main dimensions: Connectivity, Human Capital, Use of Internet, Integration of Digital Technology, Digital Public Services.

The DESI (Digital Economy and Society Index 2022) has a three-level structure as depicted in the below table

Table 34: The DESI (Digital Economy and Society Index 2022)		
Dimension	Sub-dimension	Indicator
1 Human capital	1a Internet user skills	1a1 At least basic digital skills 1a2 Above basic digital skills 1a3 At least basic digital content creation skills
	1b Advanced skills and development	1b1 ICT specialists 1b2 Female ICT specialists 1b3 Enterprises providing ICT training 1b4 ICT graduates
2 Connectivity	2a Fixed broadband take-up	2a1 Overall fixed broadband take-up 2a2 At least 100 Mbps fixed broadband take-up 2a3 At least 1 Gbps take-up
	2b Fixed broadband coverage	2b1 Fast broadband (NGA) coverage 2b2 Fixed Very High Capacity Network (VHCN) coverage
	2c Mobile broadband	2c1 5G spectrum 2c2 5G coverage

		2c3 Mobile broadband take-up
	2d Broadband prices	2d1 Broadband price index
3 Integration of digital technology	3a Digital intensity	3a1 SMEs with at least a basic level of digital intensity
	3b Digital technologies for businesses	3b1 Electronic information sharing
		3b2 Social media
		3b3 Big data
		3b4 Cloud
		3b5 AI
		3b6 ICT for environmental sustainability
		3b7 e-Invoices
	3c e-Commerce	3c1 SMEs selling online
		3c2 e-Commerce turnover
		3c3 Selling online cross-border
4 Digital public services	4a e-Government	4a1 e-Government users
		4a2 Pre-filled forms
		4a3 Digital public services for citizens
		4a4 Digital public services for businesses
		4a5 Open data

(European Commission, 2022).

At the dimension level, DESI addresses the four principal policy areas of the 2030 Digital Compass. These are not isolated areas that contribute separately to digital development, but in fact interconnected areas. As such, developments in the digital economy and society cannot be achieved through isolated improvements in particular areas but through concerted improvement in all areas. The following sections present the list of indicators in DESI 2022.
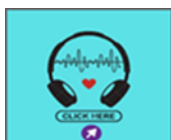
An assessment of the current state of implementation of digital transformation in the EU and Latvia is based on the data from the database of the Digital Economy and Society Index (DESI, 2020). It provides a much-needed, integrated information source on Europe's overall digital performance, tracks the progress of EU countries in digital competitiveness, and is a solid decision-making basis for policy development (European Commission, 2020).

The Digital Economy and Society Index (DESI, 2020) shows that across the EU Member States, there was impressive progress in digital transformation over the last 5 years. Latvia ranks 17th out of 27 EU Member States in the 2022 edition of the Digital Economy and Society Index (DESI). Latvia's DESI score grew at a slower pace than most of the other EU countries over the last few years. Hence, despite its efforts, Latvia has not been able to catch up with the other Member States yet.

	Latvia		EU
	rank	**score**	**score**
DESI 2022	**17**	**49.7**	**52.3**
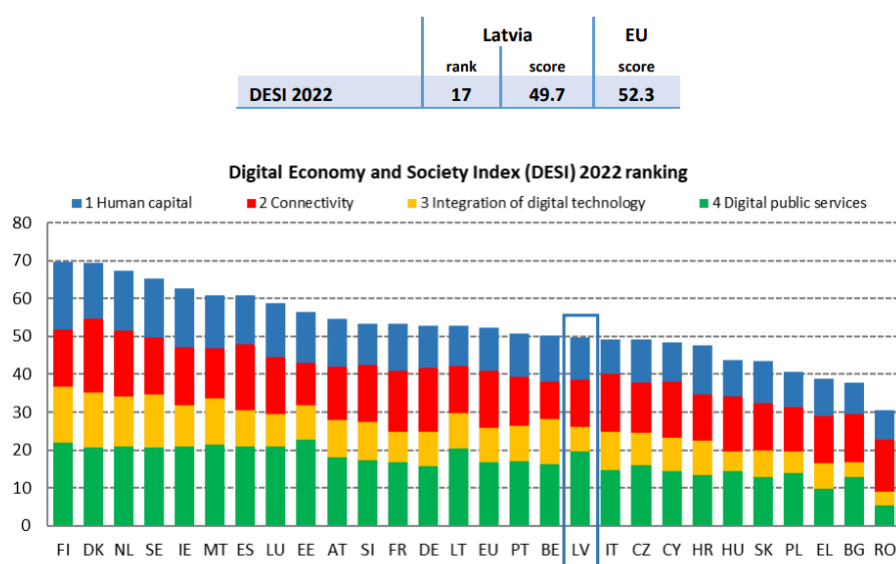
Figure 58, Source: European Commissio, 2022.

CASE OF Restaurants in Baden–Wuerttemberg, Germany

The study (Ludin, D. et al. (2022). assumes that due to lockdowns successful restaurants in Baden–Wuerttemberg have developed new digital business models. Data for the quantitative study were collected through a survey among randomly selected restaurants carried out between December 2020 and February 2021. A cluster analysis is used to identify different types of restaurants concerning their propensity to innovate and their success. Results of the study show that the level of digitization is one important factor regarding the range of entrepreneurial success.
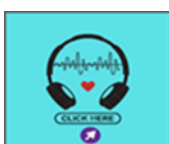
Apart from the disruptive crisis related to the COVID-19 pandemic, which might lead to the insolvency of numerous gastronomy companies, the German gastronomy sector has been undergoing a structural transformation for several years. Neisse et al. [2021, p. 4] identified, based on Franz [2020], the following underlying reasons for the structural changes that might threaten the existence and business success of gastronomy entrepreneurs, in particular, of smaller and/or family-owned businesses:

• change in customer behavior,

• increasing demands by guests on the scope, depth, and quality of the offer and the venue itself,

• reduced bargaining power of gastronomy entrepreneurs in negotiations with brewers and suppliers,

• competition with clubhouses, bakeries, and large-scale system gastronomy,

• lack of innovative capacity by gastronomy operators,

• shortage of qualified personnel and lack of company succession,

• investment backlog with low capitalization and difficult access to capital providers,

• lack of political and administrative supportive measures, and

• increasing regulation and enforcement of rules and laws (tax audits, etc.) in combination with increased demands on gastronomy entrepreneurs. (Ludin, D. et al., 2022).

The COVID-19 pandemic has also intensified ongoing discussions about the utilization of digital technology in the hospitality and gastronomy sector and has accelerated the use of digital technology [Toubes et al. (2021)]. Because of the need for contact-free solutions and the expansion or shift of service offers into the digital realm, entrepreneurs have been further challenged to set up corresponding solutions. In addition, the adoption of AI, robotics, and other digital tools into the hospitality industry might be beneficial, e.g. in terms of offering frontline services, enhancing service experiences, quality, and efficacy as well as reducing operational costs [António and Rita (2021); Belanche et al. (2020a, 2020b) in Gaur et al. (2021b); Pillai et al. (2021)]. Even though some authors assume that digital tools and information technology might play a pivotal role in the firms' sustainability and growth with regard to crisis resilience, small- and medium-sized enterprises with limited capacities for installing well-suited digital solutions might struggle in particular [Xiang et al. (2021)]. (Ludin, D. et al., 2022).

Services widely used in catering businesses are takeout/pick up, which is offered by 81% of the surveyed businesses, social media marketing (79%), online sale of vouchers (75%), a company website (75%), and a website with a menu (71%). More technically complex tools such as online audio ads and display advertising

are hardly ever used. A delivery service is also offered by a significantly smaller proportion of catering establishments (38%) than the option of takeout/collection. An online wine tasting with postal delivery of wines as well as the answer "other" can be considered as special cases, both named once. As the cluster analysis in this study is used for a data-driven division into two groups only, it can be assumed that these individual responses have no significant impact on the results.

There is a clear separation between the clusters, with a difference of 87% points for the item "search engine advertising (SEA) and/or search engine optimization (SEO)" in particular, followed by "delivery service" (54% points), "email newsletter" (31% points), "influencer marketing (31% points), "website with menu" (29% points), "social media marketing" (29% points), "online shop" (27% points). The two clusters thus differ significantly in these aspects.

However, tools such as display advertising and online audio ads can also be considered a marginal phenomenon in the group of more digitally advanced hospitality businesses — only 8% of them used these tools.

Univariate distribution of items included in cluster analysis.

- Website with menu
- Takeout
- Digital delivery service (incl. Lieferando)
- Online shop
- Online sale of vouchers
- Online wine tasting with postal delivery of wines
- Other
- Own website
- Email newsletter
- Search engine advertising (SEA) and/or search engine optimization (SEO)
        Row percentage
- Influencer marketing
- Social media marketing (Facebook, Instagram, YouTube, Twitch, etc.)
- Display advertising (banner ads on third-party websites)
- Online audio ads (audio spots on streaming services such as Spotify, Deezer, SoundCloud, etc., and on web radio stations) (Ludin, D. et al., 2022).

Associations of active cluster variables with the development of new customer groups/new markets as a result of the pandemic
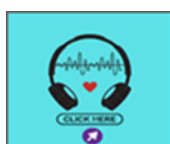
- Hardware/software for online services
- Website with menu

- Takeout
- Digital delivery service (incl. Lieferando)
- Online shop
- Online sale of vouchers
- Online wine tasting with postal delivery of wines
- Other
- Own website
- Email newsletter
- Display advertising (banner ads on third-party websites)
- Online audio ads (audio spots on streaming services such as Spotify, Deezer, SoundCloud, etc., and on web radio stations).
- Search engine advertising (SEA) and/or search engine optimization (SEO
- Social media marketing (Facebook, Instagram, YouTube, Twitch, etc.) (Ludin, D. et al., 2022).

Correlations implying that the services offered or the digital technologies used are associated with a higher probability for developing new customer groups can therefore only be found for "email newsletter" (+17 % points), "online sale of vouchers" (+12 % points), "takeout service" (+7 % points) and "online shop" (+6 % points). It is noteworthy that these are rather established and not very advanced mobile or digital services.

Conversely, catering businesses with a website appear to have attracted new customer groups to a lesser extent than businesses without a website (−25 % points). At first glance, this seems contradictory but may be caused by several factors. On the one hand, the existence of a website alone does not constitute a digital service. In addition, it is striking that companies using influencer marketing (−19 % points) were also able to acquire less new customers/markets than their competitors; none of the four restaurants that used this tool reported that they developed new customer groups. Under pandemic conditions, it is probably more important to find out how or whether customers can benefit from the service than the advertising channel per se. The same applies to search engine advertising and social media marketing (−4 % points each). However, the number of cases is very low for a proper analysis of influencer marketing. Online wine tasting with shipping of the goods and other services, as well as display advertising and online audio-ads were only mentioned by one company each. In each case, the company did not indicate that new customer groups could be tapped because of the pandemic. (Ludin, D. et al., 2022).

One reason for these somewhat unexpected results is that the pandemic may not have opened up to new groups because the relevant market segment had been tapped beforehand. The way the question was posed could thus have already ruled
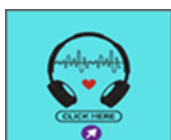
out very innovative and successful companies ("selection bias"). (Ludin, D. et al., 2022).

Overall, it can thus be stated that since the first lockdown, investments in innovations have predominantly been reflected in the development of new customer groups. Twenty-one percent of companies having reported one or more of these investments/innovations since the first lockdown (i.e. 72% of the companies surveyed) agree with the statement that they were able to develop new customer groups/markets because of the pandemic. In the other group of companies, this proportion only amounts to 8%. (Ludin, D. et al., 2022).

The pandemic and the statutory restrictions have not only disrupted the economic activities of gastronomy entrepreneurs but also the importance of restaurants and bars as part of social life [Franz (2020); Wilkesmann and Wilkesmann (2020); Xiang et al. (2021)]. Both restaurant owners and customers had to be acquainted with new service offers. Because of the pandemic situation, gastronomy entrepreneurs had the opportunity to use business model innovations to tap into new customer groups and markets. Results of the study suggest that in pandemic times the entrepreneurial success of restaurants in Baden–Wuertemberg seems to depend on different factors, one of which is the level of digitization. The existence of online menus, online ordering, online shops, online tastings, online cooking classes, online marketing, and social media marketing for restaurants transforms them to a "digital" business. (Ludin, D. et al., 2022).

53. Case Study of Sustainable Hospitality Digitalisation in Cyprus

Sustainability usually refers to the green transition of the economy to greener more environmentally friendly practices that were outlined by the United Nations in their Sustainable Development Goals (SDGs) (UN, 2022). Sustainable digitalization refers to the process of digitalising the economy in a long-lasting, green, and organic way by building on its key strength: innovative SMEs and their business ecosystems. (digitalsme.eu, 2022). Companies, organizations, regions and countries have realized how important is to push forward with the sustainable digitalization agenda because the benefits for doing so are significant on many fronts. It makes easier to access the prospective customers whether you are a company or a tourism destination, you can minimize costs, you become more efficient and effective in your operation and drives them to a net-zero carbon emission future.

In this part we will present a case study of a region that had the vision, planned ahead, invested and implemented a specific strategy to transform itself to a Smart destination and it was recently awarded as European capital of smart tourism 2023 (cyprus-mail.com/2022). It is an important award that promotes the Paphos region and Cyprus as a whole and attracts positive publicity.

Paphos is located in the southwest part of the Island and it is considered the biggest resort area with hundreds of hotels and millions of tourists visiting every year. It has a mild weather year around and has a long history and good infrastructure that includes an airport located just 14 km away from the city center. A highway is also connecting Paphos with the other major cities of Limassol, Larnaka and the capital Nicosia.

Paphos with the vision of the local authorities and the support of the hotelier association, the Organization for the tourism Promotion of Paphos (ΕΤΑΠ), the local Chamber of Commerce and the Cyprus Tourism Organization (CTO) coordinated its efforts to win this prestigious award. To get there it took effort, coordination and months of preparation according to the head of the local promotional agency Mr Chatzigeorgiou (Inbusinessnews, 2022). The mayor of Paphos mentioned that transforming a city like Paphos into a smart city with digitalized services needs a clear vision. (In business, 2022). "Paphos needs to create a personal experience for its visitors and they should feel that by using technology the city becomes friendly and accessible" he also mentioned. Paphos by winning this award creates an opportunity to further invest in digitalization in
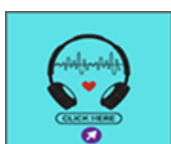
a sustainable way and promote itself as such. The award will follow a number of promotional activities organized by the local and European authorities to disseminate the news for the two awarded cities (Paphos and Seville).

The preparation for the nomination lasted several months and ended up in the prestigious award of European Smart City 2023. Seven cities in total were shortlisted for the final stage.

Paphos in order to get to this award has implemented a number of smart projects. In one of them the city will implement a smart water system that will detect any leaks in the pipelines and also high precision smart water meters will be installed that will be able to measure and transmit the accurate water consumption. A smart parking system of 3.100 spaces will also be created. The locals and the tourists will be able by using an app to detect where there is an open parking space and pay the exact amount depending on how long they parked their vehicle. That can lead to a decrease on the municipal taxation for the citizens.

Also underway there are a number of projects that digitalize Paphos and the whole region. The installment of the LoRaWAN network and of the GIS (Geographic Information System Mapping) are two important initiatives. By doing so the municipality will be able to gather manage and analyse data in real time and this will help the authorities to allocate its resources, either human or economic ones, properly. Furthermore, the municipality will be able to save considerable costs by installing smart lighting that will use LED light bulbs and the light intensity will be adjusted according to the hour of the day and the traffic. Also the city will install 55 smart columns that will provide internet access to the citizens of the city and information about the quality of the air temperature, city events and CCTV cameras. On top of the above it is in the city's plan to digitalize the archaeological sites.

All the above initiatives will upgrade the offered services to the locals and the tourists and will upgrade the tourism product of Paphos. It will differentiate Paphos from other seaside tourism destinations, it will create positive word of mouth and will lay the ground for further investment on the region that will diversify the local economy (e.g. new universities and IT companies). What it takes is visionary leadership, long term commitment and hard work and coordination from all the stakeholders involved in such projects.
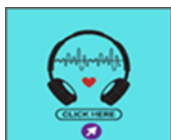
54. Case Study of Sustainable Hospitality Digitalisation in Italy

Digital is the least common ruler of the changes taking place in the tourism industry. There are several innovative trends that promise to relaunch the sector and respond to new consumer needs, after years of uncertainty and restrictions. Relatively new issues with disruptive potential are emerging, such as sustainability and the so-called endless tourism. Experiential services find new life in digital and relaunch the idea of a more authentic and unique proximity tourism, capable of safeguarding a heritage of very small local realities, largely suffocated by the growing homogeneity resulting from globalization. There are also important grafts from complementary sectors, such as Fintech and Innovative Payments, which contribute to spreading a greater "data culture" and other collateral benefits.

Numerous Italian and international players are riding these innovative trends not only to heal the wounds caused by the pandemic, but also (and above all) for their enormous future potential.

Organized tourism is paying the heaviest bill for the effects of the pandemic. However, there is no lack of innovative spirit: almost all travel agencies have in fact worked to strengthen skills, focusing in particular on communication tools such as social media and email marketing (43%), management of new sales channels, including online (31%), and customer relationship knowledge and management (18%). Some agencies then responded to the emergency by changing their management model: 4% decided to join a network or entrust the latter with the management of back office activities, 8% to close the shop and switch to online or at counseling and 19% work by appointment only.

Several tour operators are also pushing digitalisation, for example by strengthening their presence on direct digital channels and introducing dynamic packaging formulas within consumer platforms, which include increasingly essential services such as assistance and insurance (now included in the 92 % of trips sold by agencies, and in 66% of cases already included in the travel package). "There have been several innovative proposals put in place by operators in the last two years" concludes Eleonora Lorenzini, Director of the Digital Innovation Observatory in Tourism "The particular moment that we find ourselves facing, however, makes it urgent to rethink the strategies capable of direct the Journey towards new scenarios, both at the individual company level and at the sector level. An innovation 'booster', together with an efficient and effective use of public resources (such as those of the PNRR) will be able to increase the immune
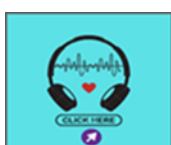
defenses necessary to face the changes that await us and the reaction capacity of each part of the system".

In 2021, 94% of facilities implemented actions to increase sustainability, such as using sustainable materials, products and energy sources or reducing waste.

7% of the structures offer the possibility of enriching the visit experience and knowledge of the destination through activities to be carried out online (before or after the trip), enriching their value proposition to offer a neverending experience, i.e. an extension of the tourist experience, both physical and digital, in space (not only at the destination) and in time (not only during, but also before and after the travel experience itself). Also with this in mind, as many as 77% of operators have equipped themselves to host smart working workers, for example by offering workstations in the room (48%) or screens for video conferences (43%).

Today 88% of the Italian accommodation facilities involved in the Research use at least one digital tool for process management, although there are different degrees of adoption and the non-hotel sector still suffers from a greater delay. The first processes to be digitized are those linked to distribution with the adoption of Booking Engines, digital payment systems and Channel Managers, to which must be added the Property Management Systems, now in use in 63% of the structures. Data analysis and Revenue Management systems follow to set up differentiated pricing strategies. The more advanced players focus on customer relationship management tools and marketing automation.

Finally, to offer experiential value in all phases of the trip and respond to the needs of tourists for greater flexibility, many accommodation facilities are working to offer the option of free cancellation and full insurance coverage (increasingly requested due to the greater uncertainty travel-related). 20% of the structures have also enabled the "Buy Now-Pay Later" service and the possibility of splitting the payment.

# 55. Case Study of Sustainable Hospitality Digitalisation in Latvia

Air Baltic Corporation AS (Latvia)

For more than a decade, Latvia has been intensively growing its start-up ecosystem to boost the creation and scaling of innovative businesses that would foster digital transformation. The fruits of diverse investment channels are already seen: there are many startups that have launched successful products, such as commercial drones, electronic identity documents, creative communication tools, and others (StartupLatvia, 2022). While a success story for a product directly beneficial to the hospitality industry is yet to come, let us look more closely at the aviation industry and its Latvian flagship, airBaltic.

The Latvian airline Air Baltic Corporation AS, worldwide known as airBaltic, is one of the most recognised and innovative companies in Latvia. Founded in 1995, the company has constantly expanded its operation network, offering direct flights from the Baltic states to many European, Middle Eastern, and CIS countries. For years, the company has received international recognition in the aviation industry, e.g., the ATW Airline Industry Achievement Award as the Market Leader of the Year in 2018 and 2019, Gold rating in the Sustainability Index 2022, and many more. The drive for innovation and digitalisation has impacted every aspect of the company's operations, from the newest aircraft fleet in Europe to the most modern guest experience in the sky (airBaltic, 2022).

The unusual approach starts with the airplanes. Since 2016 airBaltic mainly operated one of the greenest aircrafts on the market, the Airbus A220-300, which was initially developed by Bombardier Inc., a Canadian commercial jet manufacturer (Hayward, 2022). In comparison, other European airlines mostly use the versions of the Boeing 737 and Airbus A320 for short-distance flights (Luo, 2021). The aircraft provides a very modern and pleasant guest experience, with big portholes, high-placed lockers, and more spacious seats than usual, which are achieved by taking one row of seats altogether, leaving three seats on the left side and only two on the right. The choice of aircraft mirrors the ambitions of airBaltic in other areas for providing a unique service (airBaltic, 2022).

In 2022, the airline received the prize from the Onboard Hospitality Awards for innovations in providing onboard mobile service to travellers. airBaltic "Sky Service", a digital platform to use on smartphones, offers passengers a variety of tools to make their travel experience more comfortable. For example, guests may pre-order meals, buy items in the airBaltic Sky Shop, access the airline's magazine
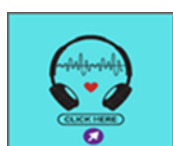
"Baltic Outlook", join the company's loyalty programme, and even find information about current destinations and ticket prices (airBaltic, 2022).

The company has also invested a lot of effort in adapting its website for mobile devices. While there is no dedicated application for ticket reservations, in 2022 more than 30% of all bookings were made through the company's website via smartphone or tablet (airBaltic, 2022).

However, while all these achievements may seem remarkable by themselves, airBaltic has taken big steps to truly surprise the world. Already in 2014, airBaltic became the first airline to accept Bitcoins for purchasing airline tickets. As follows, in 2021 airBaltic announced plans to issue collector non-fungible tokens, or NFTs. The "City Collection" of 14 artworks featured unique airBaltic planes and their registration numbers and pictures of various Latvian cities, such as Cēsis, Liepāja, Sigulda, Valmiera, Rīga, and others. In 2022, following the high interest in this collection, airBaltic decided to release a new collection of 10 000 NFT's, named "Planies", thus not only strengthening its position as an NFT issuer, but also offering added value to token holders. "Planies" is a collection of cartoon aircraft that have a unique set of features: colour, exterior design, accessories, etc. Owners of these NFT's enjoy the benefits of the airline's loyalty programme by earning extra points and getting upgrades to business class after taking a specific number of flights. The management of the company foresees that adapting the new generation of information technologies will enhance all its operations, from the customer experience to aircraft maintenance, thus allowing the company to provide fast, reliable and ultra-modern service (airBaltic, 2022).

All in all, airBaltic is at the forefront of digital innovations, promoting unique customer experiences not only in Latvia but around the world. It is setting the standard of high-quality digital service that other companies are welcome to follow.

56. Case Study of Sustainable Hospitality Digitalisation in Estonia

56.1. HotelBuddy Technology OÜ (Estonia)

Developing solutions to automate processes that require customer engagement has been the business idea of many companies for quite some time. In 2020 and 2021, the COVID-19 pandemic has set a new framework for operations in the hospitality industry. When not in lockdown, hospitality businesses had to work in accordance with strict COVID-19 control measures. The need to ensure a safe stay was driven not only by governments but also by customers, for whom contactless service became a health issue and not just a personal preference. This unique situation added value to digital hotel solutions, encouraging hotels to enhance digital transformation in various areas of their business.

One of such technologies is HotelBuddy, developed by hotel services company HotelBuddy Technology OÜ, an Estonian start-up. The company entered the market for digital solutions for hoteliers in 2021 after raising pre-seed funding from a B2B startup accelerator. Up to now, HotelBuddy has secured the partnership of two hotel chains located in Estonia and Latvia, Unique Hotels and Semarah Hotels, as well as several independent hotels (HotelBuddy, 2022).

HotelBuddy is a tool to deliver a stylish, easy, and contactless experience for guests while at the same time providing a solution for navigating every customer's engagement with the hotel. The technology allows the guest to check in, open the room's door with a mobile key, order room service or other services, check out, and pay just by using their smartphones. No additional application is required to do all these steps. For the hotel, the HotelBuddy serves as an assistant, providing information about guests, their orders, and requests, helping to hold upselling campaigns, chat with customers, etc. It is integrated with the hotel's property management system, and features may be added or excluded according to the needs of the given hotel. The technology is modular, thus allowing hoteliers to focus on issues that need the most attention, whether it is reputation, extra sales, etc. (HotelBuddy, 2022).

As already mentioned, the idea to automate processes that deal with customers directly is not completely new. There are already various solutions on the market, for example, Duve, established in 2016 in Israel, or Canary Technologies, established in 2016 in the USA, that transfer such activities to the digital milieu: not only online check-in and checkout and mobile keys, but also digital tipping, hub-emails for all communication channels, dedicated applications, and many more (HotelTechReport, 2022). What the future holds for HotelBuddy will be

revealed in the coming years. But one may say that the perspective looks positive, even without the necessity imposed by the COVID-19 pandemic. There is one more thing that these solution providers share: generally positive feedback from hoteliers. Digitalising the interaction with guests is a win-win for everyone. As Kadi Saadlo, Co-Founder at HotelBuddy puts it, digital solution allows a client who is in a hurry to skip the line and proceed directly to his or her room without delay; it decreases time-consuming tasks as manually registering guests and frees the staff to communicate with guests who are willing to interact face-to-face (Saadlo, 2022). Hoteliers praise revenue growth, cost savings, and overall increase in customer satisfaction (Duve, 2022).

While the overall response from the industry is good, the room for development of hotel solutions is broad: from the full integration of systems to cross-functionality and embedding the internet of things on a much larger scale than before (eHotelier, 2022). Let us hope that the hospitality industry will gain more attention from the global ecosystem of start-ups and that new solutions will greet us in the very near future.
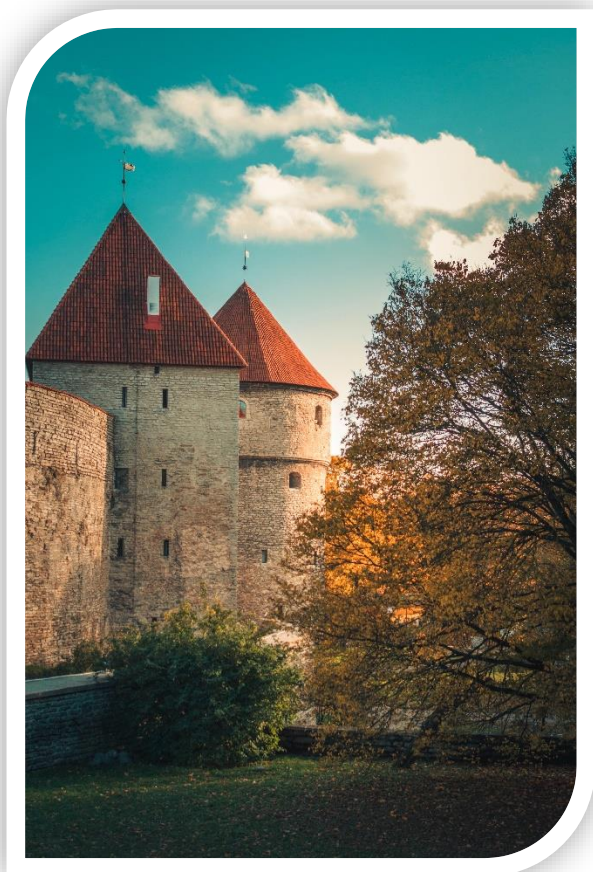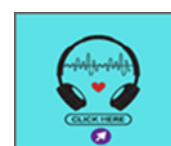

Figure 59, Source: Hert Niks

57. Case Study of Sustainable Hospitality Digitalisation in Spain

57.1. Belbo Collection

Collection of five restaurants and a cocktail bar in emblematic places of the city (five in Barcelona and one in Madrid), each of them unique and different, although they all agree on something: they all speak of the Mediterranean in its splendor.

Belbo Collection represents a new way of understanding leisure that consumes 360-degree moments and experiences. A little piece of the Mediterranean in each of the Belbos, always surrounded by a dynamic environment where things never stop happening.

Iván Salvadó, Managing Director and Partner of Belbo Collection, has tackled many digitisation processes in catering companies that were in full operation after 25 years of experience in the hospitality industry. That is why, when he took over Belbo Collection, he decided that all back and front office processes had to be 100% digitised before turning on the cookers.

He first started by looking for technology partners to digitise each of the processes. The managers of Belbo Collection chose ICG global solutions as their ERP.

Other technology providers were also chosen to digitise more specific processes: FrontRest for POS, Mapal for staff management, Cover Manager for reservation management and Voxel for administration and purchasing processes.

Through Bavel, Voxel's transaction platform, Belbo Collection restaurants have digitised the issuing of orders, the receipt of goods and the reception of invoices. All these electronic transactions are then integrated and reconciled in ICG. In this way, manual intervention is almost non-existent and the purchasing and administration process is 100% digital.

Belbo Collection has already opened 6 digital native restaurants. Currently, more than 60% of its suppliers are integrated in the Bavel network. The forecast is to reach 100% by 2022. In a second stage of the project, Belbo Collection also wants to digitise the invoices of its creditors through Voxel's PDF Billing module.

In just over a year and thanks to a digitised invoicing process, the company has automatically processed over 3,000 invoices.

Belbo Collection has become the first digitally native restaurant chain in Spain.

58. Case Study of Sustainable Hospitality Digitalisation in Spain

La Gitana Loca franchise has become one of the most famous low-cost restaurants in southern Spain, specifically in Andalusia, with a very characteristic aesthetic linked to the unmistakable Andalusian style and a clear attraction for its customers, its low selling prices (RRP) and its high quality product. The business started in Seville and little by little new shops and franchises were opened. Today we can say that there are already 12 Gitanas Locas distributed throughout Seville, Cordoba and, for some months now, Madrid.

The business model of La Gitana Loca focuses on providing both bar and kitchen service, the customer places his order at the bar and makes the payment. Both the cold tapas and the drink can be taken to the bar at the moment, while the hot tapas are brought to the table once they are ready, that is to say, the customer does not have to wait for the order as in other similar chains, as it is delivered directly to the table. This, together with the low prices, means that at peak times there is a large number of people in the premises and long queues. With this working methodology, Gitana Loca needed a centralised software that was accessible from any device and any place, and through which they could carry out a global control of all the premises.

The managers of Gitana Loca were looking for a fast and efficient way to save time both in sending orders to the kitchen and in payment. In addition, it was absolutely necessary to be able to provide an agile and error-free service. After several months of searching for POS software, La Gitana Loca contacted Camarero10, which is a POS software for the hospitality industry, and they set out the basic requirements they needed to achieve the results in terms of speed and elimination of errors in the kitchen.

With the software adaptation that Camarero10 has made for the Gitana Loca franchise, the establishment has managed to achieve a series of objectives.

1- Global integration

A global integration of the entire franchise has been generated, achieving complete control of all the premises from the same platform, centralising the product menu, stock management and purchasing.

3- Increased speed

The speed of collection has been considerably increased, thus reducing queues at peak times.

4- Doubling of clientele

With Camarero10, La Gitana Loca has managed to double the number of customers served in the same period of time.
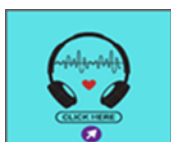
5- Better communication

The speed of sending orders to the kitchen has increased, and consequently the speed of cooking. We have also managed to eliminate errors in orders, so profitability has increased considerably.

Figure 60, Source: Dmitry Zvolskiy at pexels.com 1

59. Case Study of Sustainable Hospitality Digitalisation: International, Worldwide, North America

More than just a beautiful hotel, Burj Al Arab Jumeirah's distinctive sail-like silhouette serves as a representation of contemporary Dubai (Royist, 2020). The architecture of the Burj Al Arab, a hotel built in Dubai, is unique in many ways. This is the tallest building located on a small man-made island and one of the tallest hotels in the world. The hotel hall, 180 meters high, can easily accommodate the Statue of Liberty. In general, the design of the Burj Al Arab is very complex it was one of the first buildings, the model of which was felt to be durable even in a wind tunnel.

The Burj Al Arab hotel, built on the threshold of the millennium, has become the building of the future for its time, and not only from an engineering point of view. A blend of traditional and digital tools is used to create memorable experiences and innovative products and services in Dubai's most iconic hotel. Burj Al Arab is a symbol of Arab luxury and stands on an artificial island 280 meters high, making it visible from every corner of Dubai city (Burj Al Arab, 2022).

In 2021, for the first time in the hotel's history, Burj Al Arab opened its doors for a 90-minute tour of the impressive landmark of Dubai, bringing the exclusive experience of exploring the luxury, landmarks and history. The tour is tailored to every age and interest, complemented by culinary experiences, great views and unique stories (Inside Burj Al Arab, 2021).

The luxury tour in the hotel, also referred to as the "original home of luxury", guests have a unique chance to explore the landmark with a blend of traditional and digital tools, showcasing the innovative nature of the city (Inside Burj Al Arab Unveiled, 2021). Due to its luxury and service, the Burj Al Arab is often considered a seven-star hotel, although the official rating is five stars.

The first fully immersive digital travel platform for the hotel industry, featuring 360-degree video and photography, was developed in collaboration between Google and the upscale hotel chain Jumeirah Group, based in Dubai (Tradearabia, 2015). Access to Burj Al Arab Jumeirah is made possible by Jumeirah Inside, which features 360-degree video, 3D sound, entertaining interactions, and exclusive hotspots.

One of the impressive digitalization tools implemented in the Burj Al Arab tour is augmented reality and 360 experience. Burj Al Arab is showcased in a unique, fully digital Dubai360 city tour (Dubai360, 2020). In Dubai360 virtual tour, digital travellers can explore the city and its landmarks- parks, streets, malls, public library, luxury hotels and others, from the comfort of their devices.

Apart from being Dubai's most iconic hotel and having an impressive digitalization tool, it is also a conference hall for summits, such as ''The Global Digital Industry Summit'' which was held at the alluring Burj Al Arab Hotel on the 27th of June 2022 (The Global Digital Industry Summit was held at the Burj Al Arab Hotel on Monday, 27 June 2022).

60. Case Study of Sustainable Hospitality Digitalisation: International, Worldwide, South America

Dreams Nature Resort Cancun

Dream Natura is a luxury resort Inspired by the surrounding Mayan jungle. Dreams Resorts & Spas is committed to redefining and elevating the all-inclusive experience. With Unlimited-Luxury everything is included in guests stay, from the finest service and gourmet dining and beverages and any of the more than a dozen restaurants and bars to a host of daytime and nighttime activities.

The resort was looking for a solution to bring the resort closer to the guests' mobile phones from the time of booking and to get feedback during their stay.

To thoroughly inform about the resort and all its shows and activities in order to achieve excellence in guest experience, the Dreams Natura management printed up to 1,000 sheets per day in high season.

Around 300,000 in a year. One and a half tons of paper, plus colour ink reels, electricity... But everything changed when they contacted STAY. This was at a high cost to the hotel and had a strong impact on the environment.

They wanted the clients to be fully informed about the wide and varied quality offer they will find when they set foot in the resort. Before their arrival, from the moment they make their reservation and also to be more ecologically sustainable.

In addition, they wanted the resort to be adapted to the technological and digital world. Tourists could, through their devices, interact with the staff, and make all kinds of requests, for example: table reservations, room service, amenities, cleaning service requests, spa or show reservations…

The solution to implement and digitalise the hotel services was obtained through STAY. This is a platform to optimise the guest experience by having all the hotel information in one place and in real time.

The quick and easy implementation of STAY consolidated the resort success. At the time of booking, the hotel sends the guests a QR code indicating that they can download the app and start discovering all the explorable corners, the different restaurants with different types of food, the shows, etc." The Resident Manager goes even further: "It even allows us to personalise offers, which arrive directly on the guest's mobile phone.

Its device even allows the resort to personalise offers, which are sent directly to the guest's mobile phone. Saving more than 1,000 pages a day in high season, electricity, printer ink. More than a tonne of paper per year. Also If a human error occurs, STAY makes it possible to immediately improve the guest experience.
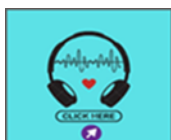
61. Case Study of Sustainable Hospitality Digitalisation: International, worldwide, India

Cultural tourism is one of the biggest attractions for the tourist and it is a known fact that many travelers who plan to visit India focus their trip on cultural tourism. And even if it is not solely for cultural; it is always a part of their package as a byproduct. We can always say that cultural tourism is always an unintentional part of every tourism destination. India with such a diversified cultural spot and a large treasure of cultural presence can create an unmatchable mark on the global destinations if handled and taken care properly. As a developing country India has already started making remarkable progress and creating an impressive impact, with a collaborative effort of all public and private to enhance all the sectors at the same time with due importance to each developmental plan. Further digitalization is also one of the major enhancements, which is creating a space for India on the global map. The sustainability of cultural tourism keeping in mind the new era of digitalization it is a challenge for a country like India to focus on both the ends and give fruitful results(Hardy, Beeton, & Pearson, 2010), (Katsoni, Vicky, Stratigea, Anastasia (Eds.), 2016), (Katsoni, Vicky, Segarra-Oña, Marival (Eds.), 2019). This paper will explore the initiatives that have been taken to make these two ends meet and create a new zone of sustainable tourism through retaining the cultural presence and digital transformation.

Digitalization enables the realization of the resilient infrastructure in every application for achieving sustainability. In the context of the hospitality business, resilient infrastructure based on digital technologies is critical for gaining the best customer feedback on providing quality service. Digital technology has already proved to enhance hospitality services with intelligent decisions through real-time data. In the previous studies, the significance of digital technologies in the hotel sector has been extended in numerous theoretical and empirical studies, yet there is a lack of research that provides a discussion on feedback systems in hospitality with digital technologies applications. With the motivation from the above aspects, this study intends to present the importance and application of the Internet of Things (IoT), artificial intelligence (AI), cloud computing, and big data implementation in customer quality and satisfaction. Moreover, we have discussed each technology´s significance and application for realizing digital-based customer quality and satisfaction. It has been identified that the AI-based system collects the input data from different common websites and compares it with a different algorithm using a neural network. According to the findings of this study, AI and personnel quality of service have an impact on customer pleasure and loyalty.
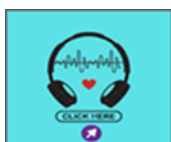
Digital transformation and digital skills, as a part of digital disruption, emerged, are still evolving and affected our lives in many ways. This digitalization has also impacted the hospitality industry by offering a contactless, seamless, and high-quality travel experience. Post COVID-19, health and safety is the top priority in hotel operations. The sanitation and hygiene of the guests have become the brand-deciding factor for guests and the key guest satisfaction aspect after services.

Munjal and Singh (2021) said that in the advent of the COVID epidemic, digitalization and technologydriven tools are much needed by the Indian hospitality industry to embrace the trend and compete in the global guest experience. Kapoor and Kapoor (2021) conducted qualitative and explorative study to get insights of digital marketing tools in 5-star Indian hotels and found online platforms to be a popular tool to gain global reach, employee engagement, talent retention, and recognition. Kaushal and Srivastava (2020) found that hygiene SOPs and optimism are the most prominent themes emerging from the COVID epidemic for Indian hospitality. Davahli, Karwowski, Sonmez, and Apostolopoulos (2020) performed a systematic review to investigate the current issues in the hospitality industry in the era of COVID-19 and found that most of the literature compared the public health crises in pre- and post-pandemic aspects and measured the impact of the COVID-19 pandemic on economic aspects. Mohanty et. al. (2020) found mobile and web-based augmented reality as extremely advantageous post pandemic to create personalized, safe, innovative, and memorable experiences. Furthermore, ICT tools, such as VR and AR, can immensely impact the tourism tour, tourism education, food and beverages, and MICE (Meetings, Incentives, Conferences, and Exhibitions) by experiencing satisfaction through multisensory touchless, seamless, and effortless devices. Sandeep et. al. (2020) studied socio-economic implications of COVID-19 in different sectors by a comprehensive literature analysis and real-life observations. IoT devices, such as mobile apps and sensors could be used to prepare future policies and strategic decision-making. Hotels are now evolving and connecting with IoT ("Connected Room" by Hilton and Marriott), Artificial Intelligence ("Connie" by Hilton Hotels), augmented reality (allowing photographs to be amplified/improved through filters and effects), virtual reality (VR tours by Indian Mumbai Hotels), recognition technology, fingerprint technology, retina scanning, Biometric Identifiers (Marriott, China), Cyber security measures to reduce cyber-attacks, ransomware attacks (Nexos by Igor).

# 62. Case Study of Sustainable Hospitality Digitalisation in China

Fast forward trend 1: Digitization

COVID-19 has not only accelerated digitization in business-to-consumer (B2C) applications and channels, but also the traditionally less digitized part of the economy, such as areas requiring physical interactions, and business-tobusiness (B2B) processes.

Before COVID-19, China was already a digital leader in consumer-facing areas—accounting for 45 percent of global e-commerce transactions while mobile payments penetration was three times higher than that of the US. Consumers and businesses in China have accelerated their use of digital technologies as a result of COVID-19. Based on our mobile surveys of Chinese consumers, about 55 percent are likely to continue buying more groceries online after the peak of the crisis. Nike's first-quarter digital sales in China increased 30 percent on year after the company launched home workouts via its mobile app, while property platform Beike said agent-facilitated property viewings on its virtual reality showroom in February increased by almost 35 times compared with the previous month. (McKinsey & Company. (2020).

Figure 61, Source: Andrea Piacquadio
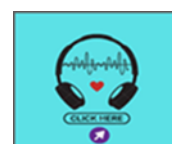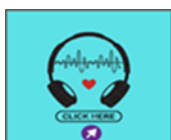
63. Professional Network for Sustainable Hospitality

Professional Network is a word which can place dread into the core of even the most sure and experienced pioneers, frequently conjuring up pictures of making casual discussion and trading business cards in a room brimming with outsiders, but we as a whole have proficient contacts and contributing an opportunity to develop and foster this organization can receive rewards both by and by and expertly. Bruines, L. (2008).

One of the extraordinary benefits of systems administration is the opportunity to gain from the encounters of the people who have gone before you. Through systems administration, you will get the opportunity to collaborate with individuals in the accommodation and the travel industry who are further along in their professions than you. Bruines, L. (2008).

Make the most of this fantastic open door by requesting their recommendation and paying attention to any tips they might offer. After a short time, you will acquire insight and find increasingly more individuals you are meeting at systems administration occasions are prior in their professions than you. This is your opportunity to pass on the guidance you got as well as any knowledge you have actually advanced in route. Bruines, L. (2008).

Professional Network accessible to more opportunities, indeed, this falls under lead age, yet it is really a monstrous advantage of systems administration. It isn't at the first spot on our list, in any case, since it isn't typically something that happens immediately. After you have acquired certainty, started fellowships, and laid out your standing, then you will begin to see an expansion in valuable open doors. Every other person is likewise constructing their own image and nobody needs to propose to associate you with open doors in the event that you haven't previously settled entrust with them. Bruines, L. (2008).

The leads you get from systems administration might promptly affect your profession, however it is different advantages of systems administration that will have a genuine effect throughout your life. Whether you are searching for a temporary position or prepared to recruit an understudy, organizing allows you the opportunity to get to know individuals across in the cordiality business.

64. Professional Network for Sustainable Hospitality Digitalisation

Hospitality industry advances have new offices and will have more significant and more profound effects. They ought to prompt decreases in mass the travel industry, customized administrations and manageability. The friendliness business was an early adopter of innovation. Throughout the long term, digitalization has changed this area and is supposed to have much more significant changes on it in the post-Coronavirus world. The future friendliness will change profoundly founded on expanded utilization of industry innovations and different customer conduct and inclinations. (Zeqiri, Dahmani & Youssef, 2020 and Chandola, 2016).

The current review explores the effects of the new influx of advances on the hospitality business. It makes a few commitments. To begin with, it portrays hospitality industry and the innovations that are reshaping the tourism industry. It looks at the difficulties the future hospitality industry will reality and how hospitality industry could less mass tourism industry, and permit customized administrations and manageability. It also examines what the future hospitality management area will resemble in a post Coronavirus world. (Zeqiri, Dahmani & Youssef, 2020 and Chandola, 2016).

Digital capacities like Brought together Information, Investigation, and Computerized systems empower mix of Business and IT, influence Client Experience, and Functional Cycles. This outcomes in expanded efficiency, higher incomes, and cost decreases. A model is the structure characterized by Cap Gemini (2011). On the effect Advanced abilities has on Client Experience, Functional Cycles, and Plans of action. Numerous perspectives characterized in the structure, for example, smoothed out client processes, cross-channel soundness, selfadministration, Execution Improvement, labourer's having the option to work Anyplace Whenever with more extensive and quicker correspondence, Functional Straightforwardness, progress from physical to advanced, and Venture Joining, as a matter of fact, likewise influence the Manageability parts of carrying on with work. (Zeqiri, Dahmani & Youssef, 2020 and Chandola, 2016).

ABB today delivered the discoveries of another worldwide investigation of global business and innovation pioneers on modern change, checking out at the convergence of digitalization and maintainability. The review, "Billions of better choices: modern change's new goal," looks at the ongoing take-up of the Modern Web of Things (IoT) and its true capacity for further developing energy effectiveness, bringing down ozone harming substance discharges, and driving
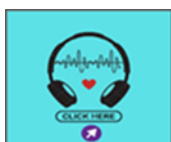
change. The objective of the new ABB research is to spike conversation inside industry in regards to amazing chances to use the Modern IoT and engage organizations and laborers to settle on better choices that can help both manageability and the reality. (Zeqiri, Dahmani & Youssef, 2020 and Chandola, 2016).

The study found that an organization's "future competitiveness" is the single greatest factor – cited by 46% of respondents – in industrial companies' increased focus on sustainability. Yet while 96% of global decision-makers view digitalization as "essential to sustainability," only 35% of surveyed firms have implemented Industrial IoT solutions at scale. This gap shows that while many of today's industrial leaders recognize the important relationship between digitalization and sustainability, the adoption of relevant digital solutions to enable better decisions and achieve sustainability goals needs to accelerate in sectors like manufacturing, energy, buildings, and transport. (Zeqiri, Dahmani & Youssef, 2020 and Chandola, 2016).
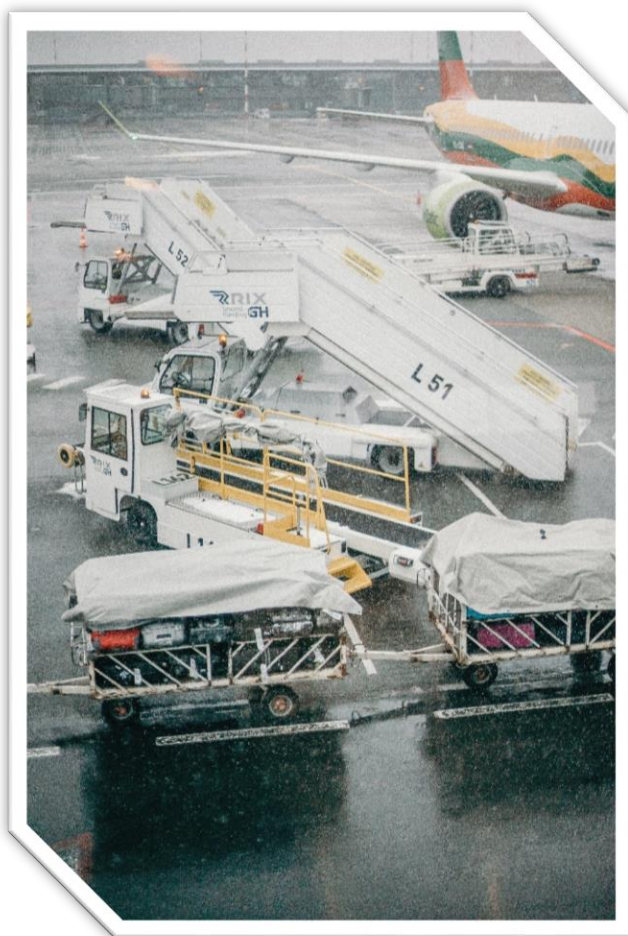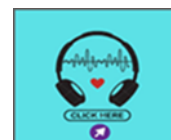

Figure 62, Source: Cottonbro studio

65. Summary

The educational material explains how to learn sustainable hospitality digitally and advance digital skills, how to infuse digitalisation in hospitality working environments, how to measure sustainable hospitality digitalisation. The guidebook includes a set of collected international practices and case studies of sustainable hospitality digitalisation and Existing market offers for digitalisation of hospitality leading to sustainability.

The Guidebook provides a review of the skills necessary for Sustainable Hospitality Digitalisation including ''The Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist'', demonstrates latest statistics, explains different indicators of related to sustainable hospitality digitalisation, roots and trends for the developments.

The tools provides a wide review of the aspects related to sustainable hospitality digitalisation and allocated in different databases, scientific articles, websites of the digital companies, statistic databases, and other. The topics are rather new, research is in continuation and further analysis stage, however, the selected data help to get a detailed review on the terms, terminology, explanations for further individual studies of every aspect individually upon the interest of the reader.

The Guidebook includes a review and summary with the links to the related regulative documents and provides an explanation what is the Digital Education Action Plan. The book includes also sustainable hospitality digitalisation theoretical framework covering definitions and concepts such as sustainability, Sustainable Development Goals, Hospitality, Sustainable Hospitality, comparing digitalisation and sustainable digitalisation while also explaining what Sustainable Hospitality Digitalisation Toolkit including insights in both sustainable hospitality concept and sustainable hospitality process.

The consortium reviews digital and digitalisation skills, green skills, the development of self-confidence respect to green, digital and digitalization skills. The Sustainable Hospitality Digitalisation Competence Framework for Hospitality Specialist has been developed on the basis of Digital Competence Framework for Citizens On the basis of DigComp 2.0, 2.1, 2.2. The authors reviewed approaches to embed sustainability, ESDGC in the content of hospitality digitalization. The guidebook explains how development of entrepreneurial ideas is supported by the competences and how to learn sustainable hospitality digitally and advance digital skills, how to infuse digitalisation in hospitality working environments, how to measure sustainable hospitality digitalisation and sustainability using the

indicators of sustainable hospitality and indicators of digitalisation as well as sustainable hospitality digitalisation with relevance to GRI (Global Reporting Indicators and other metrics). The Guidebook explains the meaning of twin transition and provides a review of International practices of sustainable hospitality digitalisation. The book explains eight learning styles, and the developed materials are based on the concept of matching these eight learning styles thus providing texted information, visual information, audio information, simulations, possibilities to involve nature in the learning process, for example, reading, listening or completing the tasks outside.

The guidebook explains the main challenges related to digitalisation, provides a statistical review on use of the digital skills and on use of the digitalised hospitality Technologies (F&B, cleaning, gardening, swimming pools), statistics on use of the digital solution for the operational and administrative processes (accounting, reservation systems, check-in systems, guest experience systems).

The book lists the economic benefits from sustainable hospitality digitalisation practices and climate action benefits from sustainable hospitality digitalisation practices as well as worldwide and regional developments in sustainable hospitality digitalisation.
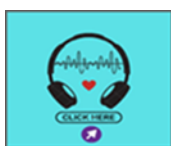
66. Conclusion

The aim of KA220-VET Cooperation partnerships in vocational education and training 'Sustainable Hospitality Digitalisation Toolkit' in the field of VET (both initial and continuing) to enhance access to training and qualifications for all by support to pooling of resources, and providing initial and/or continuing training to the staff, further strengthen key competences in initial and continuing VET, in particular digital skills, green skills, employability is achieved.

The objective of the project to develop Sustainable Hospitality Digitalisation Guidebook for initial and continuous VET Learners is performed.

The guidebook offers a review of the sustainable hospitality digitalisation theoretical framework, related definitions, skills and competences structured in a The Sustainable Hospitality Digitalisation Competence Framework. The educational material explains how to learn sustainable hospitality digitally and advance digital skills, how to infuse digitalisation in hospitality working environments, how to measure sustainable hospitality digitalisation. The guidebook includes a set of collected international practices and case studies of sustainable hospitality digitalisation and Existing market offers for digitalisation of hospitality leading to sustainability.

The guidebook is useful for:

•   Initial and continuous VET learners,

•   Hospitality industry employees: Learners, Hospitality Professionals in line with individual needs and expectations of the employers and labour market to better support competitiveness and employment in the hospitality industry at regional and local level;

•   amateurs to update information on digitalization for sustainable hospitality;
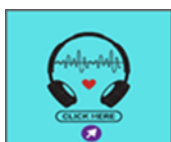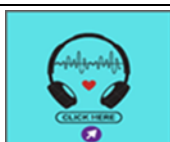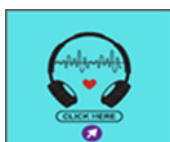
67. Glossary

Digital technology scope

The categories below formed the basis for examining the role of digital technologies in supporting the green transition of various sectors, and in identifying key functions that digital technologies enable for the green transition. While the categories provide an overview, they are not comprehensive and significant interlinkages exists between and across categories. (Muench, S. et al, 2022).

Table 35: Glossary: Digital technology scope

| Focus area	Description	Included technologies (non–exhaustive)
Artificial intelligence and smart robotics	Artificial Intelligence and smart robotics refer to a family of technologies that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals	Image, video, and audio processing Virtual assistants and recommendation systems Robotic process automation and automated vehicles Artificial Intelligence-optimised hardware Natural language processing Artificial Intelligence-empowered management systems Machine and deep learning
Data-driven technologies	Data-driven technologies refer to applications that use vast amounts of data to provide insights, make predictions, produce recommendations, and take actions.	Descriptive analytics and data visualisation Predictive analytics and simulation Prescriptive analytics and algorithmic decision-making Security analytics and threat intelligence
Internet of Things	The Internet of Things can be defined as a set of physical objects embedded with sensors or actuators and connected to a network.	Mobile and wearable devices Smart sensors and devices Internet of Things platforms Geolocation technologies
Computing infrastructure	Computing infrastructure is an umbrella term that stands for a collection of hardware and software elements enabling an organisation to perform IT operations such as data storage	High-performance computing Cloud computing Edge computing Quantum computing Optical computing DNA digital data storage Graphene-based transistors

	and processing, networking, simulation, and visualisation. Quantum computing is an emerging computing paradigm, proposing new computing infrastructure and algorithms that are significantly different from classical computers and supercomputers.	Fog computing Distributed computing Data centres
Communication technologies	Communication technologies is an umbrella term that refers to a collection of hardware and software elements enabling an organisation to send and receive information over long distances.	5G networks and handheld devices Software-defined networks 6G networks Internet Protocol version 6 Wi-Fi (wireless networking technology) WiMAX - Worldwide Interoperability for Microwave Access LoRa (short for Long Range) Low-Power Wide-Area Network protocol Bluetooth Satellite-based communication Drones
Software and service technologies	Software and service technologies is an umbrella term that refers to the activities of a specific industry concerned with the development, maintenance, and publication of software products. The term also includes the provision of business support services, technical assistance and training, engineering, consulting, and documentation.	Application programming interfaces, web services, and micro services (e.g. registries and marketplaces, focused on software and system integration) Enterprise service bus technologies and service utilities (e.g. open and linked data collection, processing, and diffusion, next generation service delivery models) Industrial process and machine programming and embedded systems Additive manufacturing (3D/4D printing) Nanotechnology (e.g. microprocessors and software

		components) Identification technologies (e.g. RFID, QR-codes, bar codes)
Distributed Ledger technologies	A Distributed Ledger technology is a decentralised way of recording asset transactions. The recording happens in several places at the same time.	Cryptocurrencies Smart contracts Decentralised autonomous organisations Decentralised finance Tokenised economy (e.g. initial coin offerings, security token offerings, non-fungible tokens
Bioinspired and neuromorphic computing	The 'bio-inspired and neuromorphic computing' cluster encompasses a large array of research endeavours and developments, which shares the commonality of: 1) a concern for the body and brain connections, and 2) the determination to explore the way to understand, visualize, and stimulate this connection through digital means, in the large sense.	Mind2machine2mind Sensorial repair Electro-stimulation Neuromorphic paradigms
Extended reality and metaverses	Extended reality and metaverses comprise a cluster of technologies that aim to: 1) augment the information available and its sourcing in a given perceptive and informative frame of action, 2) simulate options or even entirely imagined ecosystems, 3) visualise and interact with these augmented or virtual realities, and 4) construct them as fully interactive, enriched and immersive environments.	Social computing Augmented reality Mixed reality Virtual reality Interactive holograms Augmented environments Immersive environments Avatarisation Metaverses
Other	Digital technologies not classifiable in the previous categories or new technologies.	Digital technologies not classifiable in the previous categories or new technologies

(Source: Muench, S. et al, 2022).
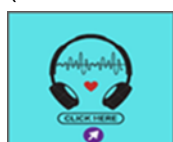
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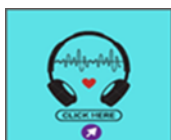
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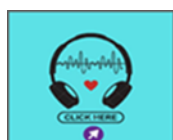
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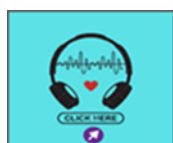
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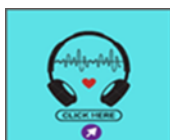
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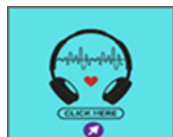
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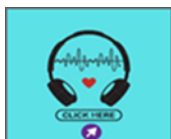
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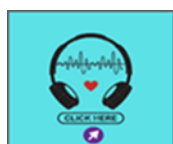
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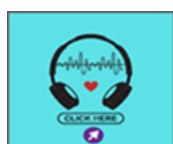
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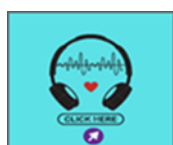
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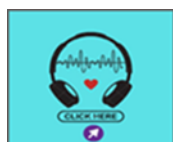
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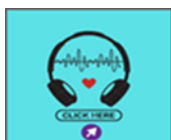
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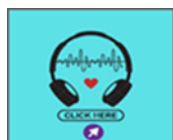
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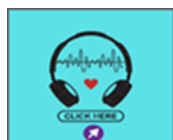
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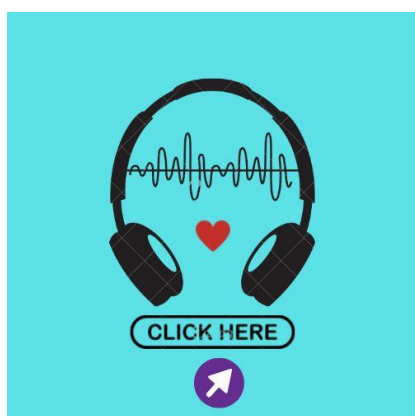
Audio recorded by Tatjana Čirkova and Olga Zvereva.
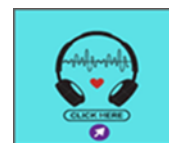
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