How will automation technologies disrupt the tourism industry?

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Robots, Artificial Intelligence and Service Automation in Travel, Tourism and Hospitality

EDITED BY
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CALL FOR PAPERS

TOURISM ECONOMICS
Special Issue on “The Economics of Revenue Management in Hospitality and Tourism”

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Tourism Management Perspectives

Special Issue: Tourism beyond humans - robots, pets and teddy bears

Editor-in-chief: Catheryn Khoo-Lattimore
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The Next Tourism Generation (NTG) is a Tourism Sector Skills Alliance for implementing a new strategic Blueprint approach to sectoral cooperation on skills.

14 partners represent the whole Tourism sector including specialists in hospitality, food and beverage, travel agencies, attractions and recreation.

The blueprint strategy will respond to skills gaps in tourism and hospitality, especially soft skills and emerging skill needs in digital and sustainability applications.

NTG project will concentrate upon to bridge the gap between education and industry and progress the skills needed.

https://nexttourismgeneration.eu
Robots, AI and automation technologies have already entered travel, tourism and hospitality ...
Application of robots, AI and automation technologies:

• **Hotels**

[Image of a mobile key for checking into a hotel]

[Image of self-service check-in machines]

https://www.regalhotel.com/uploads/ricwc/promotion/room/720x475/Mobile_key.jpg

https://media-cdn.tripadvisor.com/media/photo-s/09/48/07/4f/premier-inn-london-hanger.jpg
Application of robots, AI and automation technologies:

- Hotels
Application of robots, AI and automation technologies:

- **Hotels**

http://www.mirror.co.uk/news/uk-news/futuristic-hotel-thats-like-robotic-6449905

Application of robots, AI and automation technologies:

• *Hotels*

http://www.h-n-h.jp/assets/images/facility_img_01.jpg
Application of robots, AI and automation technologies:

• **Hotels**

Japanese hotel staffed by 243 robots fires more than half of the bots - because they kept malfunctioning and creating MORE work for the human employees

- The Henn na chain - whose name means 'weird' - bills itself as offering the world’s first hotels with robot staff
- It operates sites south of Nagasaki and east of Tokyo where the receptions are staffed by robot dinosaurs
- Chain has now culled over half of its 243 robots, many because they created work rather than reduced it

By MARK PRIGO FOR DAILYMAIL.COM

Japan's robot hotel lays off half the robots after they 'created more work for humans'

It turns out even robots can't enjoy job security

By Shervin Laker - @shervinlaker | Jan 11, 2019, 6 Japan, LSF

An 'all robot' hotel in Japan laid off more than half its robotic staff after guests complained the machines 'lacked human intelligence' and had various practical limitations. The Henn na Hotel, which translates to 'Strange Hotel', previously had 245 robot employees. The most popular ones were a voicerecognition receptionist, an automated receptionist, and one-armed baggage handler, reported The Independent.
Application of robots, AI and automation technologies:

• *Restaurant*

Photo credit: Stanislav Ivanov
Application of robots, AI and automation technologies:

- *Restaurants*
Application of robots, AI and automation technologies:

- **Restaurants**

https://www.youtube.com/watch?v=vwDLWS-_eZ8
Application of robots, AI and automation technologies:

• **Restaurants**
Application of robots, AI and automation technologies:

- *Restaurants*

https://amazing.zone/fotosblog/max/drone_q_entrega_pizzas.jpg
Application of robots, AI and automation technologies:

• *Restaurants*
Application of robots, AI and automation technologies:

• *Meetings and events > Telepresence*

Application of robots, AI and automation technologies:

• *Meetings and events / Bars*

Application of robots, AI and automation technologies:

• *Theme and amusement parks*
Application of robots, AI and automation technologies:

- *Airports and other transport stations*
Application of robots, AI and automation technologies:

• *Airports and other transport stations*
Application of robots, AI and automation technologies:

- Travel agencies and Tourist information centres
Application of robots, AI and automation technologies:

- Museums and art galleries

https://www.nytimes.com/2017/03/14/arts/design/museums-experiment-with-robots-as-guides.html?r=0

https://www.vrlife.news/wp-content/uploads/2016/05/drawntothefuture_c_agnese_sanvito_1.jpg
Application of robots, AI and automation technologies:

• *Digital assistants*

Introducing **echo show**

Now Alexa can show you things
Application of robots, AI and automation technologies:

• **Chatbots**
Adoption of robots and service automation in tourism

• *Car rental*

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**reserve**
Find a Zipcar near you and reserve it for the time you need, whether it’s for as little as one hour or as long as 7 days.

**unlock**
When it’s time for your reservation, unlock your car using your Zipcard. The keys are inside the car.

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**return**
Drop off your Zipcar in the designated parking spot. Lock up with the app or your Zipcard, and you’re done!

http://www.zipcar.com/how
Adoption of robots and service automation in tourism

• RAIA-pocalypse

Source: Daniele Gobbetti, Peer Srl, Lion-App Summer School, 6th July 2019, Trento, Italy
Adoption of robots and service automation in tourism

• *Holistic perspective*
Research on robots in tourism
Research on robots in tourism

Brave new world: service robots in the frontline

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Investigating an innovative service with hospitality robots

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Li-Cheng Chen
Department of Hospitality Management, Tajen University, Pingtung County, Taiwan, and
Chin-Yao Tseng
Department of Tourism and Leisure Management, Yuanpei University of Medical Technology, Hsinchu, Taiwan

Dawning of the Age of Robots in Hospitality and Tourism:
Challenges for Teaching and Research

Jamie Murphy 1*, Charles Hofacker 2 and Ulrike Gretzel 3
Research on robots in tourism

Adoption of robots and service automation by tourism and hospitality companies

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Eduardo Rodríguez-Lizundia a, Samuel Marcos b, Eduardo Zalama a,
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Vincent Wing Sun Tung and Norman Au

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Research on robots in tourism

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Eduardo Zalama¹, Jaime Gómez García-Bermejo¹, Samuel Marcos², Salvador Domínguez³, Raúl Feliz², Roberto Pinillos², and Joaquín López³

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Research on robots in tourism

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Research on robots in tourism


Contents lists available at ScienceDirect

Technology in Society

journal homepage: www.elsevier.com/locate/techsoc

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Stanislav Ivanov / Craig Webster / Peyman Seyyedi
Research on robots in tourism

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Stanislav Ivanov\textsuperscript{1(✉)} and Craig Webster\textsuperscript{2}

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Research on robots in tourism

Designing robot-friendly hospitality facilities

Stanislav Ivanov and Craig Webster

THE ROBOT AS A CONSUMER: A RESEARCH AGENDA

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TOURISM BEYOND HUMANS – ROBOTS, PETS AND TEDDY BEARS

Stanislav Ivanov
Research on robots in tourism

Stanislav Ivanov*

Ultimate transformation: How will automation technologies disrupt the travel, tourism and hospitality industries?


ADOPTION OF ROBOTS, ARTIFICIAL INTELLIGENCE AND SERVICE AUTOMATION BY TRAVEL, TOURISM AND HOSPITALITY COMPANIES: A COST-BENEFIT ANALYSIS

STANISLAV IVANOV AND CRAIG WEBSTER
Research on robots in tourism

Progress on robotics in hospitality and tourism: a review of the literature

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Craig Webster  
Department of Management, Ball State University, Muncie, Indiana, USA
The economics of RAISA technologies in tourism
How will RAISA technologies disrupt the tourism industry?
Impacts of RAISA technologies

Tourist company’s value chain
• Marketing
• Operations
• Facilities design and management
• Human resource management
• Financial management
• Supply chain management

Other tourist companies

Customers

Service quality
Image
Coopetition
Cooperation

Abiligest
Service
ss

Competitiveness
How will RAISA technologies disrupt the tourism industry?

OPERATIONS
Impacts of RAISA technologies

**Operations**

- *Service is delivered by* a robot, computer programme, a kiosk, a vending machine or another *non-human agent*
- *Increased service capacity* of tourism companies – more customers can be served simultaneously and for a particular period of time > *increased productivity*
- *Easier scheduling and planning of operations* – robots work 24/7, they do not get ill, complain, shirk from work, etc.
Impacts of RAISA technologies

Operations

- Reengineering of service delivery processes – new processes, activities, procedures, controls, new service operations manuals
- Increased role of the customer in the service delivery > prosumer (=“producer” + “consumer”) > co-creation of value
- Improved environmental sustainability of operations – reduced use of resources, reduced waste, elimination of unnecessary activities, etc.
- Decreased flexibility of the service delivery system
How will RAISA technologies disrupt the tourism industry?

HOSPITALITY FACILITIES DESIGN
# Types of robots to use the facilities of service companies

<table>
<thead>
<tr>
<th>Ownership</th>
<th>Type of robot</th>
<th>Mobile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Stationary</td>
<td>(wheeled, legged, flying, underwater)</td>
</tr>
<tr>
<td></td>
<td>Front desk robots</td>
<td>Security robots</td>
</tr>
<tr>
<td></td>
<td>Robot chef/Cooking robots</td>
<td>Robot guides</td>
</tr>
<tr>
<td></td>
<td>Robot baristas</td>
<td>Robot waiters</td>
</tr>
<tr>
<td></td>
<td>Robot bartenders</td>
<td>Companion/sex robots</td>
</tr>
<tr>
<td></td>
<td>Shoe shine machines</td>
<td>Pet robots</td>
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<tr>
<td></td>
<td>ATMs</td>
<td>Robotic luggage carts</td>
</tr>
<tr>
<td></td>
<td>Concierge service robots</td>
<td>Room service deliver robots</td>
</tr>
<tr>
<td></td>
<td>Security robots</td>
<td>Robotic vacuum cleaners</td>
</tr>
<tr>
<td></td>
<td>Massage robots</td>
<td>Robotic lawn mowers</td>
</tr>
<tr>
<td>Customer</td>
<td></td>
<td>Robotic pool cleaners</td>
</tr>
<tr>
<td></td>
<td>(Customers are unlikely to bring stationary robots to hospitality industries, in most situations, apart from extended stay facilities)</td>
<td>Delivery drones</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Entertainment robots</td>
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<td></td>
<td></td>
<td>General service robots</td>
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<tr>
<td></td>
<td></td>
<td>Companion/sex robots</td>
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<td>Pet robots</td>
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<tr>
<td></td>
<td></td>
<td>Concierge service robots</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General service robots</td>
</tr>
</tbody>
</table>
Robot-friendly/robot-inclusive environment (1)

• Tan, Mohan & Watanabe (2016) develop a theoretical framework for robot-inclusive environments which includes two spectra: *level of autonomy of a mobile robot* and *robot-inclusiveness of the environment* in which the robot operates.

• The authors define the robot-inclusiveness as how much the design of the environment takes into account the robot therein, i.e. whether it helps the robot fulfil its tasks.
Robot-friendly/robot-inclusive environment (2)

• The design of the premises where the robot needs to operate in, their cleanliness, tidiness, signage, lightning, noise, physical barriers (e.g. doors, doorsteps, stairs), presence of people and dynamic of the environment, presence/lack of predetermined routes for robot movement, presence/lack of (artificial) landmarks and sensors to help robot navigation, etc., all determine the degree to which the environment assists the robot fulfil its tasks – e.g. to deliver the food to the hotel room, to cut the grass in the garden, or to accompany the passengers to the airport gate.
When the environment is more robot-inclusive, then the same task can be performed by a less intelligent robot and vice versa: an environment that is not robot-friendly would require a more intelligent robot to navigate through it.
Key considerations in robot-friendly facilities design for service companies

- External physical accessibility of the premises
- Internal physical accessibility of the premises
- Digital map of facilities for robot navigation
- Landing pads for drones
- Shape and surface materials used for the pool
- Safety and security issues
- Recognition of staff, guests, delivery service, and others
- Power-related issues
- Rental facilities for robots
- Repair facilities for robots
- Liability insurance for robots
Robot-friendliness of hospitality facilities will be a new competitive advantage for travel, tourism and hospitality companies!
How will RAISA technologies disrupt the tourism industry?

HUMAN RESOURCE MANAGEMENT
Impacts of RAISA technologies

**Human resource management**

- RAISA would save employees’ time from performing tedious and repetitive tasks, which they could use for other more creative and revenue generating activities.
- Initially *enhancing*, later *replacing* the employees
- RAISA would solve some the problems with hiring and firing of employees, especially the seasonal ones.
- Sometimes RAISA would require *reorganisation of companies* – new departments, job positions, communication...
Impacts of RAISA technologies

**Human resource management**

- Changes in the *number* of employees in the various departments > *zero-employee* properties (Central hostel in Varna, Bulgaria)

- *Resistance* of employees – perceive RAISA as threat for their job positions

- Changes in the required *skills* of employees – communication, social, technical skills > required changes in the curricula of the tourism and hospitality programmes in HEIs
How will RAISA technologies disrupt the tourism industry?

MARKETING
Impacts of RAISA technologies

Product and service quality

• Changed customer expectations about the tourism / hospitality product > redefinition of the scope of the product of a tourist company – e.g. should a hotel company be able to provide robot repair service? Or a sex robot?
Impacts of RAISA technologies

Product and service quality

• RAISA could enhance the perceived service quality through new attractive and interactive ways of service delivery, communicating and engaging with customers:

  □ Robots, chatbots, service kiosks could communicate in different languages and do this 24/7
  □ RAISA can create value for the customers by making the service delivery process funny and entertaining
Impacts of RAISA technologies

Product and service quality

- Division of tourism / hospitality companies into two main large groups – ‘high-tech’ vs ‘high-touch’ companies with various shades of gray in between.
Impacts of RAISA technologies

Pricing

- Automated pricing
- Personalised pricing – perfect price discrimination
- Lower prices for mass ‘high-tech’ products
- Higher prices for exclusive ‘high-touch’ products
Impacts of RAISA technologies

Distribution

• Predictive analytics
• Automated allocation of available capacity by distribution channel > intelligent channel managers
• Distribution via digital voice assistants (Amazon Echo)
Impacts of RAISA technologies

Communications, image, positioning

• The company that adopts RAISA would boast *positive word-of-mouth* due to its *image of an innovative high-tech company*.

• The company may also suffer *negative publicity* - it may be perceived as a company that puts profits before humans.

• *Automated communications with customers* – chatbots, voice assistants, robots
Impacts of RAISA technologies

Robots as consumers and tourists

Autonomous car’s involvement in the consumer behaviour of

<table>
<thead>
<tr>
<th>Stage</th>
<th>Autonomous car’s involvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need recognition</td>
<td>• Identify the need for car maintenance after specific number of kilometres or months since last maintenance</td>
</tr>
<tr>
<td>Information search</td>
<td>• Find authorised car maintenance centres</td>
</tr>
<tr>
<td>Evaluation of alternatives</td>
<td>• Find available time slots at authorised car maintenance centres</td>
</tr>
<tr>
<td></td>
<td>• Decide on the specific service and price</td>
</tr>
<tr>
<td>Purchase decision</td>
<td>• Select the time slot that best matches the schedule of the owner</td>
</tr>
<tr>
<td>Purchase</td>
<td>• Make payment with the e-wallet of the owner</td>
</tr>
<tr>
<td>Consumption process</td>
<td>• Drive to the car maintenance centre</td>
</tr>
<tr>
<td></td>
<td>• Undergo maintenance</td>
</tr>
<tr>
<td></td>
<td>• Drive back to the owner’s home</td>
</tr>
<tr>
<td>Post-consumption behaviour</td>
<td>• Perform check whether the systems of the car operate properly</td>
</tr>
</tbody>
</table>
If a robot can make these decisions, who is the consumer then – the robot or its owner?
How will RAISA technologies disrupt the tourism industry?

FINANCIAL MANAGEMENT
Impacts of RAISA technologies

Financial management

• *Labour costs savings* – RAISA work 24/7 and may serve numerous customers simultaneously.

• *Increased sales* – customers’ curiosity in seeing the robots, 24/7 availability
Impacts of RAISA technologies

Financial management

Financial costs, associated with RAISA (1)

- **Acquisition costs** – e.g. for purchasing a robot or kiosk, for purchasing a chatbot/payment for its development.
- **Installation costs** – might be virtually zero for a chatbot.
- **Maintenance costs** – electricity consumption of the robot/kiosk, spare parts, periodic maintenance, repair works, etc. They will be zero for a chatbot.
- **Software update costs**.
Impacts of RAISA technologies

Financial management

Financial costs, associated with RAISA (2)

• **Costs for adapting the premises to facilitate robot’s mobility** – e.g. removing any barriers for robot’s movement within a hotel.

• **Costs for hiring specialists** to operate and maintain the robots/kiosks/chatbots.

• **Costs for staff training**.

• **Insurance costs** for the robots/kiosks, insurance for damages caused by a robot, etc.
How will RAISA technologies disrupt the tourism industry?

SUPPLY CHAIN MANAGEMENT
Impacts of RAISA technologies

Supply chain management

• Integration of the information systems of suppliers and travel, tourism and hospitality companies

• Automated orders

What factors determine the impact of RAISA technologies on travel, tourism and hospitality companies?
Factors determining the impacts of RAISA

- Company characteristics / culture
- Market positioning of the company
- Relative labour and technology costs, relative labour and RAISA productivity
- Degree of technological complexity / Technological characteristics of RAISA solutions
- Safety characteristics of RAISA
- Customers’ readiness and willingness to be served by a robot, willingness to pay for robot-delivered services
- Employee’s readiness and willingness to work with a robot
- Cultural characteristics of both customers and
Cultural characteristics of society
Robots have arrived and are here to stay.

Prepare …
References and further reading


THANK YOU FOR THE ATTENTION!

QUESTIONS?