UDC 001:091:075.8
JEL Classification: O11

Melike Gül, Kudret Gül

THE EFFECT OF FOURTH INDUSTRIAL REVOLUTION ON TOURISM

Balıkesir University, Turkey

Industry 4.0 applications are predicted to cause dramatic changes in the tourism sector in the coming years. In the coming years, it is very important that stakeholders focus on change in communication technologies and new integration trends in the tourism sector. At this point, it is very likely that new crises will emerge between the parties and new paradigms need to be settled to resolve these crises. The aim of the study is to examine the effect of fourth industrial revolution on tourism based on the literature. The studies in the literature show that applications of the fourth industrial revolution will lead to new threats and opportunities in the tourism sector within the context of the Industrial Revolution paradigm, especially in transportation, marketing, tourist expectation and service types. Big data analysis, cloud system, internet of objects and simulation can cause radical changes in service delivery and marketing in the tourism industry. The digitization of products, big data and cloud computing will make it easier to understand and meet individual customer needs more accurately. Smart buildings and cyber security applications will cause major changes in the physical environment in the accommodation sector. With Industry 4.0 applications, sightseeing of destinations and facilities in virtual environment, reservations, room selection, food and drink can be pre-ordered. Intelligent robots may be able to offer services such as greeting, transfer, bell-boy services, payment, promotion, on-site guidance, food and beverage orders. In this sense, it would also be possible for producers and consumers to share different creativity and experiences based on the use of high technology. In addition, with Industry 4.0 applications, such practices undoubtedly point to multi-faceted changes for tourists and managers seeking different experiences in the future of the industry. Finally, it seems that tourism will go on to provide peace, stability and socio-cultural rapprochement among the countries during fourth industrial revolution. Thus, new trends will lead to emerge a new revolutionary process in the tourism industry.

Keywords: Fourth Industrial Revolution, Tourism, Interaction.

DOI: 10.32434/2415-3974-2018-8-2-33-39

Introduction

The production of the first calculator and then the invention of the computer with digital developments in communication technologies have given a new dimension to production processes. With the third industrial revolution, automation-based production led to an increase in productivity, which resulted in the reduction of weekly working hours and the right to annual paid leave in the worldwide. In this period, according to Barutcugil (1980: 44) tourism movements have increased depending on the effect of income distribution to be more equitable, development of communication technologies, horizontal and vertical integrations in tourism industry, travel credits, emergence of new destinations, changes in fashion, pleasure and preferences. Thus, rapid increase in world population, urbanization, crowding, noise, pollution, environmental destruction and other problems caused by industrialization, which are accompanied by the 3rd Industrial Revolution, necessitating holiday for people by increasing their physical and psychological depression.

Literature Review

Change and innovation development have accelerated dramatically through recent years in all industries as well as tourism industry. Social changes based on the effect of industrial revolution have

increased vulnerability. According to Parrinello (1993: 244) tourism is immersed in a universe of signs, which also spill over into working hours, thus creating continuity between work and leisure. This relationship is typical of post-industrial societies. Granot (1998: 197) suggests that development of a vastly expanded scientific enterprise providing the initiative for the technologies that have changed society first time in history in the second half of the twentieth century.

According to Kuhn's scientific revolution paradigm, phenomena that can be explained by existing scientific theories constitute the existing paradigms. Over time, the contradiction of new discoveries with existing paradigms triggers new crises, and this problem becomes stable with the acceptance of new paradigms (revolutionary science) instead of the old ones. However, new findings obtained over time begin to contradict the latter paradigms. This cycle then continues (Gunes, 2003: 28). According to this scientific revolution paradigm approach, technological developments that trigger the industry 4.0 such as large data components, internet of the objects, 3d printers, cloud computing, cyber security, simulation, horizontal and vertical system integration, enhanced reality, robotics and smart factories, it may turn into a problem or opportunity for the future of all industries. On the other hand, Gherasim and Tanase (2012: 457) indicate that the demographic explosion generated by the increase of welfare and industrial revolution has caused an ascending evolution of tourism activity. Kozak et al. (2013: 7) argue that production process, technological developments, social structure, and the nature of the tourism market are the main factors that influence the change of the tourism paradigm. Depending on these factors, they also suggest that three paradigms have emerged historically in the tourism industry as «Paradigm of Pre-Modern Tourism», «Modern Tourism Paradigm» and «Post-Modern Tourism Paradigm».

According to Vardar (2016), while the first three industrial revolutions focus on efficiency and added value, Industry 4.0 is moving towards a service industry with a post-modernist paradigm. According to Bulut and Akçacı (2017: 50), Industry 4.0 is the power of the machine to take in the human power and to be able to manage production processes automatically. Moavenzadeh (2015) states that the digitization of products, big data and cloud computing will make it easier to understand and meet individual customer needs more accurately. In this process, Vardar (2016) emphasizes that the themes such as after-sales services, consumer feedback, integration in the global supply chain, efforts to attract global investors into the field of production, centralization in production, protection of the environment and green technologies have become more popular. It also suggests that Industrial 4.0 applications such as robotic technologies, cyber physical systems and intelligent factories are still in the «revolutionary science» stage. But the concept of «Internet of services» that might be popular in the coming years is likely to give Industrial 4.0 as a «scientific revolution". Davutoglu et al. (2017: 63) argue that industrial revolutions affect the historical development processes of all sectors, especially increasing the effect of Industry 4.0 will go on the creation of new sectors by production of smart products with intelligent factories without human power, and with new robot technologies. They also emphasize that new technological factors such as the Internet of the services and the internet of the objects will transform the traditional business models by irresistibly affecting them, and leave the labour-intensive sectors in a difficult situation. On the other hand, Fırat and Fırat (2017: 21) argue that the issues such as pay wages, absenteeism, inefficiency, low cost of labour, food, health expenses, service for transportation and other legal expenses will stand out in the smart factories and buildings of the future. They also argue that energy expenditures such as heating and lighting in intelligent buildings have been left behind, which saves energy and reduces CO2 emissions in the face of climate change, thus contributing to environmental protection on behalf of sustainability.

According to Vardar (2016), the main objectives of the first three industrial revolutions are the mission of continuous improvement, a place of production and reproduction. The Industry 4.0 project has a post-modernist structure that not aimed at enlightenment and progress, yet is protected by a patent and newer imitated by this quality, targeting centralization and automation of service. Thus, Industry 4.0 shows the main innovative direction in the centralization of the production and the desire for full control in the service value chain. Bulut and Akçacı (2017: 52) argue that the globalization process and the information society compatible with technology will reveal a production process that is personal, natural and visual perception with the introduction of cyber-physical systems in production.

With Industry 4.0 applications in the worldwide, the weight of the capital factor and the qualified workforce in employment is increasing in the combination of the total production factors. But the need for an unqualified and semi-qualified workforce is continuously diminishing (Vardar, 2016). On the other hand, it is targeted 4-7% increase in productivity over the next decade with industry 4.0 practices in Turkey, and a growth of over 1% in GDP and 1-1.5% increase in investments. This process will increase the employed work force, better quality of education and high labour income level and so on. Thus, Turkey's will be reached high level of world income pyramid by developing «know-how»

(TÜSİAD Endüstri 4.0, 2016: 14). These trends also point to possible structural changes in Turkish tourism in the coming years.

Cloud technology applications and mass data sharing can present serious threats to the future. However, it is also possible that these possible threats can be overcome with cyber security systems. Taking into consideration of the risk sensitivity of the tourism industry, this issue will become even more important in the future. On the other hand, it is important that computer generated data such as graphics, audio, video, and enhanced reality applications that define the indirect and direct view through a new perception environment created by combining elements played through emotional input into the physical world in the Industry 4.0. It is possible for employees and people who are not in the same environment to brainstorm, identify their problems, find solutions to these problems, and develop innovative ideas by using enhanced applications and data sharing (Ötleş ve Özyurt, 2016: 92). In the coming years, 3D simulation applications are also expected to become increasingly common both in product design and production processes. In these applications and virtual models, which are prepared using real-time data, the virtual reality of the physical world can be created. The Internet of objects also plays an important role in the application of Industry 4.0. This application is based on the fact that a larger number of devices are connected to each other by standard technology and utilized by integrated data processing. Another noteworthy application in Industry 4.0 is the three-dimensional and articulated production transition. In this way, it is possible to produce special products for niche markets or for private consumers at low cost (TÜSİAD Endüstri 4.0, 2016; Şahin ve Yağcı, 2017: 17).

The development of cities, increase in population, progresses of science and technique, information, automation and influences of cybernetics generate spare time. Thus, all these trends made tourist activities more important in our life (Gherasim and Tanase, 2012: 464). On the other hand, the field of virtual reality has also great importance in new tourism trends. The "virtuality" machine involves a full immersion in computerized programs that will provide contact in real time. As a result, a number of people can easily share their holiday experience (Parrinello, 1993: 244).

Significant changes are expected in transport technology with Industry 4.0. As experienced in previous three industrial revolution processes, it is inevitable that new transportation technologies that will emerge with Industry 4.0 will cause radical changes in the tourism industry. Li-Pin (2017: 392) indicates that governments and tourism businesses focus on new public transportation systems that prioritize improvement in the quality and suitability of vehicles such as larger, more comfortable seats for the elderly and family tourists, entertainment options while on a bus, mobile applications to provide travel information, proper scheduling for bus shuttles and relevant facilities are all likely to increase tourist ridership.

It is predicted that robots will focus on heavy work such as construction, mine, sewage, while people will focus on information and managerial work in the future. In the tourism industry, it is highly probable that robots will be able to carry out strenuous and unattractive jobs such as waitresses, cleaning and garbage (EBSO, 2015: 40). It is emphasized that new occupations emerging in service sector employment in the US in the last decade are very sensitive to computerization, that the latest growth in the service robots market is supported by this judgment, and thus, the comparative advantage of human labour in some skill-related jobs is getting less and less favourable (Fərat ve Fərat, 2017: 21). On the other hand, it is suggested that consumers using active Internet in tourism can save time and cost in terms of instant feedback, solution, interest and expectation of problems with cloud computing, large data analysis and high technology usage (Юahin ve Yapcə, 2017: 18). These developments are likely to threaten the superiority of tourism as a service sector due to the potential for job creation in the coming years. Moreover, Industry 4.0 applications such as large data components, robotic technologies, smart factories, centralization and environmental sensitivity has the potential to shift the employment policies of the tourism industry to a very different paradigm in the adaptation process of transportation, accommodation and food/beverage sectors.

In recent years, information and communication technology (ICT) usage plays significant role for both consumers and producers in the industry. Law et al. (2014: 733) indicate that travellers who have more information and communication technology (ICT) usage experience have greater repurchase intention, while tourism suppliers benefit with reservation, marketing, guest services, operational management, human resources, security and so on. On the other hand, by using these technologies, innovative individuals can spread their projects that they have developed based on competence, ability and experience on the internet and spread them to all over the world (Siemens Endьstri 4.0). On the basis of these developments, innovative projects that depending on consumer expectations will become widespread in the tourism industry and this will lead to very important changes in the industry.

Reid (1995) presumes that industrial revolution have served to reflect and extend the disparities between the wealthy and the poor of the world. On the other hand, Granot (1998: 196) indicates that

once industrialization has begun, the dark side of the industrial revolution has accelerated pollution of the air and rivers, systematic abuse of the world's resources, brutal exploitation, exploitation of the weaker societies, sectors and colonies around the world to the advantage of the privileged few, were all early attributes of the revolution. In response to these development, Swami and Sharma (2011: 376) emphasis that the new management strategies can apply for the environmental protection like planning of product, new technological procedures to serve the guest, investment in environmental protection plans, formulation of effective services for environmental protection in the coming years in the tourism industry.

In the light of these evaluations, a rich and diverse revolution literature may provide the background for growing awareness that the effect of industrial revolution on shareholders in the tourism industry.

Conclusion

Industry 4.0 applications include mass data and analysis, intelligent robots, simulation, vertical and horizontal system integration, objects' internet, cyber security, cloud technology, articulated production and enriched reality. Assuming an increase in the long distance travels in the coming years, it can be predicted that Industry 4.0 applications will facilitate communication, integration and centralization between producers, consumers, intermediaries and other stakeholders in the tourism industry. However, it is likely that new crises will emerge between the parties and a new paradigm for resolving these crises will also be needed. For this reason, it is recommended that stakeholders should be prepared for the possible crises that may arise in integration and centralization of the services in the tourism industry within the context of Industry 4.0 applications.

With Industry 4.0 applications in the tourism industry, sophisticated catalogue products that all processes of a holiday package are displayed on the market can come into being by simulation. Such applications would be able to remove the «intangibility, inseparability, variability and uncertainty» characteristics of the tourist product.

With Industry 4.0 data analysis applications, heat and speed problems can be solved in certain restaurants, systematic recordings of complaints can be kept, waiters' working speeds and error ratings can be observed and the information can be shared simultaneously and distributed by the cloud system (TÜSİAD Endüstri 4.0, 2016). Therefore, in terms of producing consumers who expect different and value-creating product services, Industry 4.0 targets an experience close to perfection (Юahin ve Yapcэ, 2017: 18).

Within the scope of Industry 4.0 applications, facilities such as sightseeing of destinations, virtual environment, reservations, room selection, pre-order food and beverage can be provided. In this sense, it would be possible for producers and consumers to share many different creativity and experiences based on the use of advanced technology. In addition, with Industry 4.0 applications, intelligent robots can also offer services such as greeting, transfer, bellboy services, payment, promotion, on-site guidance, food orders. Such applications may undoubtedly be attractive to customers looking for different experiences.

As a result, the industrial revolution processes that have emerged in the historical process have affected the tourism industry in a multifaceted way, and the tourism industry has also played an active role in accelerating the industrial revolution processes. It is a reasonable approach for stakeholders in the tourism industry to make the most of the opportunities that the Industry 4.0 process, which will be increasingly effective in the coming years. Thus, we recommend the stakeholders to take the best possible measures, minimize threats and risks, and act proactively.

REFERENCES

1. Bulut E. ve Akçacı T. (2017). Endüstri 4.0 ve İnovasyon Göstergeleri Kapsamında Türkiye Analizi. *ASSAM International Refereed Journal,* 7, 50-72.

2. Davutoğlu, N. A., Akgül, B. ve Yıldız, E. (2017). İşletme Yönetiminde Sanayi 4.0 Kavramı ile Farkındalık Oluşturarak Etkin Bir Şekilde Değişimi Sağlamak. *Akademik Sosyal Araştırmalar Dergisi,* 5(52), 544-567.

3. Ege Bölgesi Sanayi Odası (EBSO). (2015). Sanayi 4.0: Uyum Sağlayamayan Kaybedecek!. Araştırma Müdürlüğü Raporu, 1-53.

4. Fırat, S. Ü. ve Fırat, O. Z. (2017). Sanayi 4.0 Devrimi Üzerine Karşılaştırmalı Bir İnceleme: Kavramlar, Küresel Gelişmeler ve Türkiye. Toprak İşveren Dergisi, 114, 10-23.

5. Gherasim, M. E. and Tanase, G. (2012). The Evolution and Inter-Dependence of Tourism with the Environment. *Contemporary Readings in Law and Social Justice,* 4(1), 457-470.

6. Granot, H. (1998). The dark side of growth and industrial disasters since the Second World War. *Disaster Prevention and Management: An International Journal,* 7(3), 195-204.

7. Güneş, B. (2003). Paradigma Kavramı Işığında Bilimsel Devrimlerin Yapısı ve Bilim Savaşları: Cephelerdeki Fizikçilerden Thomas S. Kuhn ve Alan D. Sokal. Türk Eğitim Bilimleri Dergisi, 1(1), 23-44.

8. Kozak, M. A., Evren. S. ve Çakır, O. (2013). Tarihsel Süreç İçinde Turizm Paradigması. *Anatolia: Turizm Araştırmaları Dergisi,* 24 (1), 7-22.

9. Law, R., Buhalis, D. and Cobanoglu, C. (2014). Progress on information and communication technologies in hospitality and tourism. *International Journal of Contemporary Hospitality Management,* 26(5), 727-750.

10. Li-Pin, L. (2017). Industrial tourists' behavioral intention toward slow travel in Taiwan, *Journal of Sustainable Tourism,* 25 (3),

379-396.

11. Moavenzadeh, J. (2015). The 4th Industrial Revolution: Reshaping the Future of Production. https://www.eiseverywhere.com/file_uploads/fe238270f05e2dbf187e2a60cbcdd68e_2_Keynote_John_Moavenzadeh_World_Economic_Forum.pdf, Access Date: 10.04.2018.

12. Ötleş S. ve Özyurt, V. H. (2016). Endüstri 4.0: Gıda Sektörü Perspektifi. Dünya Gıda Dergisi, (Mayıs 2016), 90-96. http://egeplm.ege.edu.tr/wp-content/uploads/2016/05/endustri40_dunya_gida.pdf Access Date: 12.04.2018.

13. Parrinello, G. L. (1993). Motivation and anticipation in post-industrial tourism. *Annals of Tourism Research,* 20, 233-249.

14. Reid, D. (1995). Sustainable development. London: Earthscan Publications.

15. Şahin, N. N. ve Yağcı, P. (2017). Endüstri 4.0 Kapsamında Prosumer Kavramının Yiyecek İçecek Sektörü Açısından Değerlendirilmesi. *Journal of Recreation and Tourism Research,* 4 (Special Issue 1), 12-22.

16. Siemens. Endüstri 4.0, http://cdn.endustri40.com/file/ab05aaa7695b45c5a6477b6fc06f3645/End%C3%BCstri_4.0_Yolunda.pdf Access Date: 12.04.2018.

17. Swami, R. and Sharma, S. (2011). "Hotel industry embraces "Green Revolution" across the globe. *International Transactions in Applied Sciences,* 3(3), 363-380.

18. TÜSİAD. (2016). Türkiye'nin Küresel Rekabetçiliği İçin Bir Gereklilik Olarak Sanayi 4.0: Gelişmekte Olan Ekonomi Perspektifi, Yayın No: TÜSİAD-T/2016-03/576, p.1-64.

19. Vardar, S. (2016). IV. Endüstri Devrimi Paradigması. Kalkınmada Anahtar Verimlilik, (Ekim 2016), 334, https://anahtar.sanayi.gov.tr/tr/news/iv-endustri-devrimi-paradigmasi/7296 Access Date: 20.03.2018.

Received 10.10.2018
Reviewer: ass. prof., PhD Riabtseva O.E.

ВПЛИВ ЧЕТВЕРТОЇ ПРОМИСЛОВОЇ РЕВОЛЮЦІЇ НА ТУРИЗМ

Меліке Гюль, Кудрет Гюль

Передбачається, що наслідки четвертої промислової революції призведуть до різких змін у секторі туризму в найближчі роки. Дуже важливо, щоб зацікавлені сторони зосереджувались на зміні комунікаційних технологій та нових тенденціях інтеграції у сфері туризму. На цьому етапі існує велика ймовірність того, що між сторонами виникатимуть нові кризові явища, і для вирішення цих криз мають бути врегульовані нові парадигми. Метою дослідження є вивчення впливу четвертої промислової революції на туризм на основі літератури. Дослідження сучасної літератури показують, що застосування продуктів четвертої промислової революції призведе до появи нових загроз та можливостей у секторі туризму в контексті парадигми промислової революції, особливо у сфері транспортування, маркетингу, очікування туристів та типів послуг. Аналіз великих обсягів даних, хмарна система, Інтернет-об'єкти та моделювання можуть призвести до радикальних змін у наданні послуг та маркетингу в індустрії туризму. Оцифровка продуктів, великих обсягів даних та хмарних обчислень дозволять суб'єктам туристичної діяльності більш точно зрозуміти та задовольняти потреби окремих клієнтів. Розумні будівлі та додатки в галузі кібербезпеки спричинять значні зміни у фізичному середовищі в секторі розміщення. В умовах Industry 4.0 огляд визначних пам'яток та об'єктів у віртуальному середовищі, бронювання, вибір номерів, продукти харчування та напої можуть бути попередньо замовлені. Інтелектуальні роботи можуть запропонувати такі послуги, як привітання, передача, послуги дзвінків, оплати, інструкції на місці, замовлення продуктів харчування та напоїв. У цьому сенсі виробники та споживачі також зможуть поділитися різними творчими здібностями та досвідом, заснованим на використанні високих технологій. Крім того, така практика, безсумнівно, вказує на багатогранні зміни туристів та менеджерів, які шукають різного досвіду у майбутньому галузі. Нарешті, здається, що туризм буде продовжувати забезпечувати мир, стабільність та соціокультурне зближення серед країн під час четвертої промислової революції. Таким чином, нові тенденції призведуть до появи нового революційного процесу в індустрії туризму.

Ключові слова: Четверта промислова революція, туризм, взаємодія.

ВЛИЯНИЕ ЧЕТВЕРТОЙ ПРОМЫШЛЕННОЙ РЕВОЛЮЦИИ НА ТУРИЗМ

Мелике Гюль, Кудрет Гюль

Предполагается, что последствия четвертой промышленной революции приведут к резким изменениям в секторе туризма в ближайшие годы. Очень важно, чтобы заинтересованные стороны были сосредоточены на изменении коммуникационных технологий и новых тенденциях интеграции в сфере туризма. На этом этапе существует большая вероятность того, что между сторонами будут возникать новые кризисные явления, и для решения этих кризисов должны быть урегулированы новые парадигмы. Целью исследования является изучение влияния четвертой промышленной революции на туризм на основе литературы. Исследование современной литературы показывают, что применение продуктов четвертой промышленной революции приведет к появлению новых угроз и возможностей в секторе туризма в контексте парадигмы промышленной революции, особенно в сфере транспортировки, маркетинга, ожидания туристов и типов услуг. Анализ больших объемов данных, облачная система, Интернет объекты и моделирование могут привести к радикальным изменениям в предоставлении услуг и маркетинга в индустрии туризма. Оцифровка продуктов, больших объемов данных и облачных вычислений позволят субъектам туристической деятельности более точно понять и удовлетворять потребности отдельных клиентов. Умные здания и приложения в области кибербезопасности повлекут значительные изменения в физической среде в секторе размещения. В условиях Industry 4.0 осмотр достопримечательностей и объектов в виртуальной среде, бронирование, выбор номеров, продукты питания и напитки могут быть предварительно заказаны. Интеллектуальные роботы могут предложить такие услуги, как приветствие, передача, услуги звонков, оплаты, инструкции на месте, заказ продуктов питания и напитков. В этом смысле производители и потребители также смогут поделиться различными творческими способностями и опытом, основанным на использовании высоких технологий. Кроме того, такая практика, несомненно, указывает на многогранные изменения туристов и менеджеров, которые ищут разного опыта в будущем отрасли. В результате создается впечатление, что туризм будет продолжать обеспечивать мир, стабильность и социокультурное сближение среди стран во время четвертой промышленной революции. Таким образом, новые тенденции приведут к появлению нового революционного процесса в индустрии туризма.

Ключевые слова: Четвертая промышленная революция, туризм, взаимодействие.