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# THE MEDIATING ROLE OF CO-PRODUCTION IN THE RELATIONSHIP BETWEEN INFORMATION TECHNOLOGIES AND SERVICE INNOVATION

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*ABSTRACT*

*Service innovation has become increasingly important in recent years due to the competitive advantage it provides to companies operating in the service industry. Therefore, it is necessary to understand the factors that affect service innovation. In the few studies conducted on different sectors, the relationship between co-production and IT and service innovation has been tried to be tested separately. In this study, the mediating role of co-production in the effect of information technologies on service innovation in the tourism sector has been investigated. In this way, it will contribute to the literature by investigating the effect of IT (directly and indirectly) and co-production (directly) on service innovation in the tourism sector. In the study data collected from 222 hotel managers were firstly subjected to validity and reliability analysis. Then, mediation analysis was applied within the scope of hypothesis tests. According to the results obtained, co-production has a mediating role in this relationship. In the study, it was concluded that the IT capabilities of the hotels enable them to create service innovations through production together with online travel agencies.*

*KEYWORDS*

*Innovation; Service Innovation; Co-Production; Information Technologies; Mediation*

*ECONLIT KEYS*
*O00, O30, L86, Z31*

## 1. INTRODUCTION

In the globalizing world with new technologies, economies are becoming dependent and companies are faced with an increasingly risky and competitive environment. For this reason, companies innovate using technology and try to be agile organizations that can adapt to this dynamic environment (Mainardes, Funchal and Soares 2017; Lee and Lim, 2018). The success of companies operating in the service sector, which creates employment opportunities and ensures economic growth, is also important. Because the service sector has become the most dynamic component of the global economy and international trade. Services account for around 50% of world trade (WTO, 2021) and make a great contribution to ensure economic stability in this uncertain environment. Tourism is considered the chief service sector in the world. When considered the area covered in total trade volume and the employment created, the tourism industry significantly affects world trade (WTO, 2019). Therefore, it is important that the tourism sector, which is one of the most important branches of the service sector, adapts to the new world order and is able to respond quickly to ever-changing needs. The globalized tourism market offers a diverse customer portfolio from different languages and cultures, with exceptional wishes and needs. For tourism organizations to overcome the problems created by this diversity and offer services with high perceived value to their customers, service innovation is needed. In addition, the Covid-19 pandemic (Fotiadis, Polyzos and Huan, 2021), which affected the world in early 2020 and affected the tourism sector quite badly, showed how important successful service innovation is to maintaining competitiveness in tourism companies (Gössling and Scott, 2020). Because in this extremely difficult and untried crisis environment, only businesses that implemented a series of innovations by following health and safety-oriented policies quickly were able to maintain their assets (Sharma et al., 2021).

However, it is known that innovations that increase the competitiveness of companies in the tourism sector are affected by many factors. Divisekera and Van Nguyen (2018) classifies these factors in two groups as internal entrepreneurial elements such as cooperation, human capital, information technology, financing, and institutional factors such as foreign ownership, market competition, firm size. Grissemann, Pikkemaat and Weger (2013) emphasize that the main drivers of innovation are information technology innovation management, employee engagement, innovation networks, and customer participation. Jiménez-Zarco, Martínez-Ruiz and Izquierdo-Yusta (2011) state that customer orientation, competitor orientation and inter-functional coordination affect tourism innovations. They also emphasize that information technologies should be used strategically. The previous researches above show that information and communication technologies are an important component for innovation in the tourism sector. Because technological developments have facilitated cross-border service offerings, thus creating new opportunities for national economies and individuals. Also it enables innovations that bring dynamic capabilities to organizations even in crisis environments such as the covid-19 epidemic (Rha and Lee, 2022). From this point of view, this study focuses on the direct and indirect effects of information and communication technologies (IT) on the service innovation process. There are many studies on the technology-service innovation relationship in the literature, but a theoretical framework has not yet been formed for the discussions on the strategic role of technology in the context of service innovation (Ryu and Lee, 2018). However, the technological change is very fast, and the variety of technologies required to influence both results and processes in service innovation is very high. Therefore, there appears to be an increasing trend towards both short-term and long-term B2B partnerships with service providers or technology suppliers. Although technology suppliers are powerful drivers of technological innovation and influence the outcome and process of service innovation (Biemans and Griffin, 2018; Homayounfard and Zaefarian, 2022). In other words, service innovation requires participatory production (Sako et al., 2006). Despite all this, these partnerships have been largely ignored in the literature. When the studies that deal with co-production and service innovation together are examined, a limited number of

studies have been found. In the few studies conducted on different sectors, the relationship between co-production and IT and service innovation has been tried to be tested separately. In order to overcome this limitation and meet the needs of theory and practice, more empirical studies are needed to understand the role of technology in service innovation. For this reason, the direct effect of information technologies on the service innovation and the indirect effect on the co-production variable were investigated. This study, which is aimed at examining the factors effecting service innovation in the tourism sector, is important because it contributes theoretically and practically to service innovation in the tourism literature. Based on all these, the study tries to fill the gap in the literature and reveals the structural relationships between the relevant variables.

The rest of this study is organized as follows. In the second part, a literature review is provided for concepts, hypothesis development, and a suggested research model. In the third part, the research method is given. Empirical results are presented in the fourth section. The fifth part is devoted to the discussion of findings, theoretical and management conclusions. In the last part, the limitations of the study and suggestions for future studies are included.

## 2. THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

The success of tourism businesses is accepted to depend on innovation (Zhang, 2017). Innovation is the primary point for tourism businesses operating in a very competitive environment to develop and maintain their competitive advantage in a global market. Especially the innovations that hotels and travel agencies will offer in their products increase their competitiveness (Marušić et al., 2019). The success of the hotel businesses in introducing the services produced to the ultimate consumer, namely the tourists, enables them to stay ahead of their competitors. Figure 1 shows the traditional distribution system that provides delivery of services in the tourism sector.

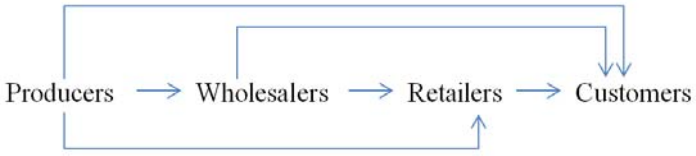


Figure 1. Traditional Distribution System in the Tourism Industry
Source: Holloway and Taylor (2006)

Tour operators are wholesalers who buy the products such as hotel rooms, transportation services and sell the package they create to tourists either directly or through travel agencies. On the other hand, travel agencies are retailers selling package tours or accommodation, transportation, etc., services offered by suppliers (Holloway and Taylor, 2006). Technological developments have created radical differences in the distribution system that operates in this way.

Information technologies such as the internet, which removes borders, are also used extensively in the tourism sector and enable service producers to access their customers directly in this market. Online travel agencies showing up with information technologies have become another distribution channel (Keskinkılıç, Ağca and Karaman, 2016). Today, reservation sites such as Booking.com and Tripadvisor are the companies that take a substantial share from this market. For example, as of 2019, Tripadvisor's worldwide net income was approximately $126 million (Statista, 2021a). Hotel businesses reduce their distribution costs and gain higher profit and market share thanks to their cooperation with service providers, such as online travel agencies (Karamustafa and Öz, 2008).

Studies on the use of information technologies (IT) in the tourism industry have generally focused on the consumer or supplier perspective (Ip, Leung and Law, 2011). However, these technologies help produce innovative services and offer a competitive advantage (Kitsios and Kamariotou, 2019). Furthermore, it supports the knowledge sharing between customers and the business and the production process and can speed up new service deliveries to customers (Kitsios and Kamariotou, 2019). In this context, IT can be said to have the potential to provide co-production based on the customer's participation in business processes (Brandsen and Honingh, 2018; Lember, 2018). Therefore, it is necessary to emphasize the ability of IT to create

innovation and the cooperation that should be made with the resources that will enable innovation.

### *2.1) THE EFFECT OF IT ON SERVICE INNOVATION*

Information technologies (IT) take part in the management of many substantial activities and business processes, such as enriching the knowledge base, processing, use, and dissemination of information by getting information from internal and external partners such as employees, stakeholders, customers, suppliers (Vendrell-Herrero, Bustinza and Opazo-Basaez, 2021). Information technology is a crucial component in the innovation process (Parida and Örtqvist, 2015). Well implementation of service innovation, which includes many activities such as producing new services, improving or expanding existing ones, increases the success of businesses. In the current literature, close relationships are widely believed to be between information technologies and innovation in different contexts and that technology facilitates innovation development processes (Ziyae, Sadeghi and Golmohammadi, 2021). IT improves and accelerates the flow of information between business networks inside and outside the organization (Parida and Örtqvist, 2015), restructures business applications, and integrates routine tasks (Majchrzak and Malhotra, 2016).

Along with these, there are many studies on the relationship between technology and service innovation. Shamim et al. (2021) revealed that big data management capabilities in hospitality businesses positively affect service innovation and organizational performance. Similarly, Gao, Liu and Mai (2020) found that technologies such as 5G and machine learning positively affect service innovation and organizational performance. Vendrell-Herrero, Bustinza and Opazo-Basaez (2021) suggest that R&D team structure governs the relationship between IT processes and service innovation; Blichfeldt and Faullant (2021) also revealed that companies' high level of digital technology use increases service innovation.

Depending on all these, information technologies are thought to increase the ability to create innovation, provide service production, and service improvement opportunities (Jiménez-Zarco, Martínez-Ruiz and Izquierdo-Yusta, 2011). It is also

suggested that it acts as a catalyst for companies to reach their innovation goals and expands markets (Arvanitis, Loukis and Diamantopoulou, 2013) and results in low cost, fast production, superior quality, efficiency, and economic development (Ziyae, Sadeghi and Golmohammadi, 2021). Both in tourism, an information-intensive industry, and in other service businesses, it is expressed that information technologies have positive effects on developing services and creating innovative, satisfying services that can respond quickly to changing conditions/needs (Chen and Tsou, 2007; Chen, Tsou and Huang, 2009; Jiménez-Zarco, Martínez-Ruiz and Izquierdo-Yusta, 2011; Marušić et al., 2019; Ziyae, Sadeghi and Golmohammadi, 2021; Vendrell-Herrero, Bustinza and Opazo-Basaez, 2021) and increase commercial success (Januszewska, Jaremen and Nawrocka, 2015). From this point of view, the following hypothesis was formed:

*Hypothesis 1a: Information technologies have significant positive effect on service innovation*

### *2.2) THE EFFECT OF IT ON CO-PRODUCTION*

The history of co-production is as old as human history. However, the industrial revolution has shown that enterprises could not create all production elements on their own, and their ability to respond to demands would weaken. This situation paved the way for the understanding of co-production with the sectoral partners of the enterprises (Saruhan and Özdemirci, 2013). Companies must constantly and rapidly adapt to a complex, dynamic, and highly interconnected global environment shaped by technology in the information age. Many companies have started various cooperation types to create new products and services to gain a competitive edge, increase productivity, and turned all relevant elements, including the consumer, into a part of production (Etgar, 2008). "Co-production," a process in which inputs from individuals who are not in the same organization are converted into goods and services (Ostrom, 1996), allows the partners to be actively involved in the design and delivery of services (Durose et al., 2017; Lember, Brandsen and Tõnurist, 2019). Information technologies,

leading to inclusive and user-oriented innovation processes, enabling customer participation for better services and products (Lember, 2018), making it possible to transform vast user-generated input into socially and economically valuable products and services, have become the core component of the co-production process. (Lember, 2018). Because digital technologies enable efficient information flow and offer many functional supports, they coordinate production together, create new collaboration opportunities, replace traditional human-centered processes with self-organizing processes (OECD, 2017; Lember, 2018). Technology directly or indirectly affects co-production and facilitates co-production (Brandsen and Honingh, 2018).

There are viewpoints in the literature, suggesting little systematic evidence exists on how digital technologies affect co-production, digital technology use will not guarantee co-production, and the way of service professionals and users design particular digital solutions for co-production is significant (Brandsen and Honingh, 2018; Lember, Brandsen and Tõnurist, 2019). In line with all these studies, the following relationship between co-production and IT was formed.

*Hypothesis 2: Information technologies have significant positive effect on co-production.*

### *2.3) THE EFFECT OF CO-PRODUCTION ON SERVICE INNOVATION*

Studies on co-production were often focused on public administration and marketing (Durose et al., 2017). However, it has attracted the attention of many management branches, thus was generally considered as the participation of customers in the production process as a result of their interaction with service providers and the degree of this participation (Arıca and Kozak 2018). Co-production, which provides the opportunity to produce in harmony with customers, ensures an accurate needs analysis. It reduces the service problems of businesses. It creates an opportunity to improve service outcomes and offer new services (Blazquez-Resino, Molina and Esteban-Talaya, 2015). Therefore, it is considered significant to examine whether co-production practices impact service innovation. Studies have shown that co-production

is one of the main drivers of the service innovation process and positively affects service innovation (Chen, Tsou and Huang, 2009; Chen, Tsou and Ching, 2011; Chen et al., 2015)

In addition, Bovaird (2007) broadened the scope and expressed co-production as cooperation between many groups, such as professional service providers, users, suppliers, and other community members. Accordingly, it has been suggested that innovation is created through collaborative strategic partnerships established with supply chain networks, customers, internal and external resources (Bigdeli et al., 2018). The tourism sector has applications suitable for this description. Few businesses in the tourism sector have an R&D department. The organization purchases related products and services rather than producing the technology. This situation strengthens cooperation and ensures that relevant service providers are involved in production. In addition, Hjalager (2002) stated that the tourism innovation determinants would be found outside the sector, not only inside. For example, intense collaborations are conducted in industries, such as consultancy or information and communication services. Technological applications such as online booking, check-in/out, holiday research and planning, TripAdvisor, and other travel evaluation websites facilitate customers' participation in production (de Oliveira and Baracho, 2018). In addition, research on travel agencies has shown that co-production with customers positively affects perceived service outputs both directly and indirectly (Arıca and Kozak, 2018). In line with this information, considering that co-production affects service innovation, the following hypothesis has been formed:

*Hypothesis 3: Co-production has significant positive effect on service innovation.*

### *2.4) RESEARCH MODEL AND MEDIATION EFFECT OF CO-PRODUCTION*

It is hard to examine the direct impact of IT capability on firm innovation in the service industry. This situation may stem from other mediating effects between IT capability and firm innovation (Huang, Li and Cheng, 2009). In particular, the success of companies that want to create service innovation is usually thought to depend on the

organization's closeness to the customer and how well it understands and meets customer needs (Parry, Bustinza and Vendrell-Herrero, 2012). Service innovation results from combining organizational changes and technology most accurately and requires participatory production (Sako et al., 2006). The firms integrate IT into their operations by restructuring their intra- and inter-organizational business processes (Opresnik and Taisch, 2015). While creating service innovation, these IT processes function as a communication link between the business and customers (Cenamor, Sjödin and Parida, 2017) and facilitate integrating interested parties (customers, etc.) into co-production. Network connections and information sharing increase the level of innovation (Zach and Hill, 2017). The inclusion of IT and customers in production plays a significant role in creating service innovation (Parry, Bustinza and Vendrell-Herrero, 2012; Baines et al., 2017; Vendrell-Herrero, 2021). Based on this information, the following hypothesis was formed:

*Hypothesis 1b: Information technologies has an indirect effect on service innovation through co-production mediator variable.*

Figure 2 presents the research model of our study. The model includes information technologies, co-production, and service innovation variables. The direct and indirect effects of information technologies on service innovation are investigated.

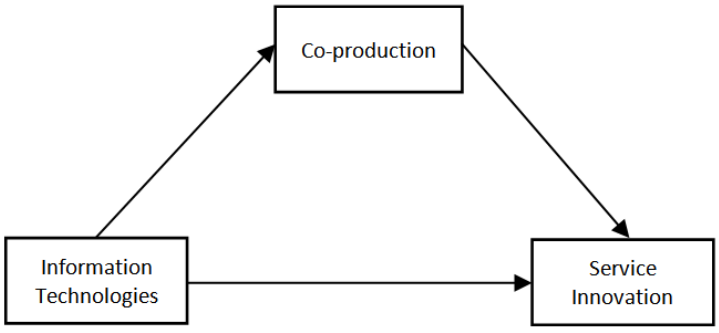


Figure 2. Research Model

## 3. RESEARCH METHOD

### *3.1) DATA COLLECTION*

Turkey's tourism sector had a $34.52 billion size (Statista 2021b) in 2019, which corresponded to 4.5% of $761.4 billion GDP (Statista, 2021b; World Bank, 2021). According to the same year's data, Turkey ranks 6th among the top ten countries having the highest number of tourists. Hotel management, which is the visible face of tourism, is the most contributing tourism element to the country's GNP. Especially within package tours, Germany, Russia, and England are among the top five countries that send the most tourists to Turkey. There are two different categories of hotels in Turkey, approved by the municipality and the Ministry of Culture and Tourism. The current study did not perform this hotel distinction and covered hotel managers in both categories in the sampling. In the first stage, potential hotel manager positions that can participate in the research were determined and only relevant people were contacted through the LinkedIn search section. More detailed information about the participants is shared in the next section. Afterwards, a short informative text about the purpose of the research and the concepts used was shared with the participants before starting the survey. Connections were established with hotel managers via the Linked-in program, and questionnaires were sent online between August and October 2021. A total of 1186 online questionnaires were directed to potential participants, intermittent reminders were given to non-responders, and a final response was obtained from 222 participants. The questionnaire response rate is approximately 19%. Since all questions are determined to be mandatory, there is no missing data in the data obtained.

### *3.2) SAMPLE AND MEASUREMENTS*

DeVellis (2017) has stated that 200 samples suffice for confirmatory factor analysis. According to a different view, valid participant answers of five times the item numbers (Gorsuch, 1983) suffice for confirmatory factor analysis. The number of participants is above the minimum of both requirements. The sample characteristics of the study, which included hotels working with at least 1 service provider, are shown in Table 1. The positions of the respondents were stated as General Manager (39.6%), Assistant

General Manager (4.9), Human Resource Manager (6.7%), Purchasing Manager (0.9%), Sales and Marketing Manager (6.3%), Front Office Manager (12.1%), Customer Relationship Manager (6.7%), Technical Service Manager (3.6%), and Others (19%). Of the participants, 69.3% said they were working with five and more service providers, and 59.8% said they have been operating with the service providers for over five years.

| Characteristics | Frequency | % | Characteristics | Frequency | % |
|---|---|---|---|---|---|
| **Job position** | | | **Operating time (year)** | | |
| General manager | 88 | 39.6 | 0-3 | 31 | 13.9 |
| Deputy general manager | 11 | 4.9 | 3-5 | 21 | 9.4 |
| Human resources manager | 15 | 6.7 | 5-10 | 63 | 28.3 |
| Customer relationship manager | 15 | 6.7 | 10 and above | 107 | 48.1 |
| Front office manager | 27 | 12.1 | **Number of service providers worked with** | | |
| Purchasing manager | 2 | 0.9 | 1 | 14 | 6.3 |
| Sales-marketing manager | 14 | 6.3 | 2-4 | 54 | 24.3 |
| Technical service manager | 8 | 3.6 | 5-8 | 35 | 15.7 |
| Other | 42 | 18.9 | 9 and above | 119 | 53.6 |
| **Number of staff** | | | **Working time with service providers (year)** | | |
| 0-9 | 17 | 7.6 | 0-3 | 44 | 19.8 |
| 10-49 | 59 | 26.5 | 3-5 | 45 | 20.2 |
| 50-249 | 79 | 35.5 | 5-10 | 77 | 34.6 |
| 250 and above | 67 | 30.1 | 10 and above | 56 | 25.2 |

Table 1. Sample characteristics (N=222)

The survey used in the study consisted of two stages. Descriptive questions were in the first part, and the items of three scales were in the second part of the survey. Information technology (Adapted from Saeidi 2019; 11-items), Co-Production (Adapted from Chen, Tsou and Ching, 2011; 6-items), and Service Innovation (Adapted from Chen, Tsou and Ching, 2011; 6-items) scales were used in the study. The scale was created to measure three constructs: IT, Co-production and Service Innovation. The items under the IT structure measure the IT use and adaptation capabilities of companies and the benefits of IT use to the company, and the contribution of information and communication technologies to the development of new products or services. The level of cooperation of the companies with the service providers and the

participation of the service providers in the service creation process is measured by the items under the co-production structure. The items in the service innovation structure, measure the ability of companies to improve their existing services and create new services. The adaptation of the scale items from the original language to the target language was carried out by following the 10 steps (preparation, forward translation, reconciliation, back translation, back translation review, harmonization, cognitive debriefing, review of cognitive debriefing results and finalization, proofreading, final report) stated by Wild et al. (2005). After the preparation phase was carried out by the authors, the forward translation was carried out by two independent people. One translator was a professor in English language and literature. The other translator was a full-time professor in the business administration who has been involved in scale development for many years. In addition, he has been working as an editor for many years in international publishing houses. Translator and expert numbers used in the study are compatible with Kalfoss (2019). Review processes were carried out by three experts working in the field of business under the supervision of the authors. Back translation was done by a professor with high language proficiency. In the cognitive debriefing phase, a pretest was made with 12 people and their opinions were taken about each item. After proofreading by the professor of English language and literature, the final version of the scale was given by the authors. All items were configured as the 5-Likert type.

### *3.3) MEDIATION MODEL*

Mediation models try to define the indirect effect of the mediator on the dependent variable or outcome. Mediation analysis is one of the most effective methods to examine the complex relationships between three variables (Yoon, Ro and Cho, 2019). Baron and Kenny (1986) have recommended four steps to implementation for mediation analyses. These four steps are independent variable - dependent variable relation, independent variable - mediator relation, mediator-dependent variable relation, and mediator variable in independent variable - dependent variable relation. Mediation analysis is one of the most effective methods to examine the complex

relationships between three variables. The theoretical model created was tested with the Model-4 (Hayes, 2018) using the SPSS Process Macro plugin with the average composite scores on the items in each factor. In the study, co-production was used as a mediator variable in the relationship between information technologies and service innovation. Service innovation was defined as the dependent variable in the study. The analyzes included (1) the direct and indirect (through co-production) effect of information technologies on service innovation, (2) the impact of information technologies on co-production, and (3) the effect of co-production on the service innovation examined. The statistical significance of the mediation model was based on 10,000 boot-strap samples and tested with 95% bias-corrected confidence evaluated intervals.

## 4. RESULTS

### *4.1) SCALES AND MEASUREMENTS*

The factor loadings of the constructed structure should be above 0.4 to express the adequacy of the measurement model in confirmatory factor analysis (Hair et al. 2010). The fact that the item factor loads of the 22-item scale were between 0.69 and 0.94 proved that it was above the desired value. The convergent validity of the scale was tested by Average Variance Extracted (AVE) and Composite Reliability (CR) as seen in Appendix A, and correlation matrix of variables as seen in Appendix B. According to Hair et al. (2014), AVE and CR reference values should be >.50 and >.70, respectively. AVE values of the scale between 0.74-0.83 and the CR values between 0.94-0.96 were above the desired reference values. Therefore, the scale could be stated to have convergent validity. In the reliability analysis, the internal consistency coefficient (Cronbach alpha) of the sub-dimensions was calculated. The Cronbach alpha values of 0.94-0.97 for the sub-dimensions were above the desired reference value of >.70 (Taber, 2018). Accordingly, the reliability of the scale was tested and proven. The measurement model was seen well-consistent with the values of $\frac{x^2}{sd} =$ 2.30,

RMSEA=0.078, NFI=0.97 according to the analysis performed through the LISREL program.

### *4.2) MEDIATION ANALYSIS*

The hypotheses created in the research model were tested with the SPSS PROCESS macro plugin, and the results were shared. The direct effect of information technologies on service innovation was tested under Hypothesis 1a. The results showed that the direct effect of information technologies on service innovation was significant and positive (effect=0.525, p=0.000). Information technologies had a positive effect on co-production (effect=0.630, p=0.008). This result supported Hypothesis 2. Co-production affected service innovation positively (effect=0.287, p=0.000). The results obtained supported hypothesis 3. Table 1 shows the analysis results of hypothesis 1a, hypothesis 2, and hypothesis 3. Finally, the mediating role of co-production in the impact of information technologies on service innovation was tested under Hypothesis 1b. Because of the hypothesis tests, it was proven that co-production had a mediating role (effect=0.181, p=0.000) in the impact of information technologies on service innovation. Table 2 shows partially standardized and completely standardized effect results. In testing the mediating role, the lower limit confidence interval (LLCI) and upper limit confidence interval (ULCI) range should not contain zero. The examination of the LLCI and ULCI value ranges showed that the achieved values did not contain zero.

| | coeff | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| **Information Technologies on co-production** | 0.630 | 0.073 | 8.598 | 0.000 | 0.485 | 0.774 |
| **Co-production on service innovation** | 0.287 | 0.046 | 8.988 | 0.000 | 0.410 | 0.641 |
| **The Direct effect of information technologies on service innovation** | 0.525 | 0.058 | 6.177 | 0.000 | 0.198 | 0.379 |

Table 2. Analyses of the hypotheses
(LLCI= lower limit confidence interval, ULCI= upper limit confidence interval)

| Co-production | Effect | Se | LLCI | ULCI |
|---|---|---|---|---|
| **Indirect effect** | 0.181 | 0.043 | 0.102 | 0.274 |
| **The Partially standardized indirect effect** | 0.183 | 0.041 | 0.106 | 0.270 |
| **The Completely standardized indirect effect** | 0.168 | 0.041 | 0.093 | 0.257 |

Table 3. Mediation analyses

### *4.3) SUMMARY OF RESULTS*

H1a, H1b, H2, and H3 hypotheses shown in the research model were tested and supported. The current study aimed to determine the factors affecting service innovation. The findings revealed that information technologies had direct and indirect effects on service innovation. Co-production had an impact on service innovation. The result was compatible with the study of Chen, Tsou and Ching (2011).

## 5. DISCUSSION

### *5.1) THEORETICAL IMPLICATIONS*

In this study, how IT affects service innovation through co-production is empirically investigated. The results show that the IT levels (Mean=3.88) of the responding firms are close to high level. Co-production levels (Mean=3.80) are above the medium level. It has been determined that service innovation levels (Mean=3.81) approach to a high level. The few studies in the literature have examined the impact of IT and co-production on service innovation separately. In this study, it is tried to contribute to the literature by testing a more holistic structure, taking into account the existence of relations between the structures.

Services are easier to copy than physical products and more difficult to protect with patents (Chen and Tsou, 2007). However, service companies must continue to innovate in order to remain competitive. Firms in the hospitality and tourism industry maintain their competitive positions by creating service innovation by offering new values to customers or restructuring the value creation process (Lee et al., 2021). The knowledge required for service innovation can only be obtained through IT from within

or outside the company (Platfautt et al., 2015). IT is recognized as an important facilitator in creating service innovation (Xu, Sharma and Hackney, 2005) and providing inter-organizational learning (Scott, 2000). Thanks to IT, companies operating in the tourism sector can learn the requests of their potential customers and realize service innovations by evaluating them (Orfila-Sintes, Crespi-Cladera and Mandartinez-Ros, 2005). In addition, in recent years, methods such as big data, artificial intelligence, data analytics, machine learning have been used in the hospitality and tourism sectors. Location-based services, virtual reality, and augmented reality applications are now widely used in the tourism industry (Liberato et al., 2018). Personalized services can be generated in the tourism sector using applications, such as data mining (Buhalis, 2000). The ability to create service innovation for hotels means applying adequate knowledge obtained from many sources to new services, processes, or systems (Tang, Wang and Tang, 2015). Hotels can create new services by using hardware and software tools effectively. These new methods help companies develop service innovation by generating real-time data and identifying what customers value (Aluri, Price and McIntyre, 2019). In general, most of the service innovations are realized through the widespread use of IT (Barrett et al., 2015). The first hypothesis of the study was formed and tested on the relationship between IT and service innovation in this direction. With the obtained results, it was determined that IT had a significant and positive effect on service innovation and the hypothesis was supported. The result obtained is in agreement with the studies in the literature. Similarly, Nambisan (2013) determined that IT contributes to the service innovation process and service innovation output as an operant and operand resource.

As in all sectors, companies in the tourism sector cannot compete with their competitors only with the resources they have. Resource dependence theory draws attention to the interdependence of firms and suggests that firms cooperate in order to overcome the constraints arising from their situation or environment (Pfeffer and Salancik, 2003). Nowadays, where outsourcing is becoming more and more widespread, companies do not bear the transaction costs arising from using traditional tools. The development and competition in information and communication technologies have allowed companies to use IT tools at low costs. Thanks to IT,

companies' national or international suppliers or service providers can access and analyze real-time data. Sanders and Premus (2005) concluded in their study that the IT capability of companies has a significant and positive effect on intra-firm and inter-firm cooperation. IT, which facilitates cooperation between companies, also allows companies and service providers to produce together. Co-production can only occur when companies open their knowledge base to service providers (Ordanini and Pasini, 2008). This is possible thanks to the effective use of IT tools. The hypothesis between IT and co-production was formed and tested on these grounds. When the results obtained were evaluated, it was concluded that IT had a significant and positive effect on co-production. Wherton et al., (2015) also concluded in their study that technology directly and indirectly affects co-production. It can be stated that the result obtained is in line with the studies carried out. When evaluated tourism in terms of supply chains, service providers might be not only suppliers but also customers of hotels (Johnston and Clark, 2008). Considering the B-to-B context, hoteliers and service providers develop e-services together. While it is significant to understand the external customer impact of e-services, the great potential here emerges in the B-to-B market (Croom and Johnston, 2003). Using information technologies that enable co-production between hotels and service providers will provide real-time information access, efficient information flow, and coordination of co-production (Lember, 2018).

Along with another hypothesis of the study, the relationship between co-production and service innovation was tested. According to the results obtained, co-production effects service innovation positively and this effect is significant. Chen, Tsou and Ching (2011) reached similar results and concluded that co-production has a positive effect on service innovation and the development of new products or services. In addition, Xie, Wang, and Garcia (2021) concluded that co-production activity with supply chain partners has a positive effect on co-production performance. With service innovation, companies focus on creating new value for customers (Woo, Kim and Wang, 2021). By ensuring customer participation in service innovation, customer feedback and expertise in their fields can be benefited. In addition, new services that can be a solution to existing problems can be developed through co-innovation (Bhatti, Larimo and Servais, 2020). When evaluated within the scope of the study, the co-production

of the hotels with the travel agencies will allow the acquisition of new ideas, expertise and perspectives. Since both parties in the relationship will want to create a competitive advantage over their competitors, they will also ask each other to increase their contribution levels (Chen, Tsou and Ching, 2011). This will have a positive effect on the service innovation process of companies.

### *5.2) MANAGERIAL IMPLICATIONS*

In recent years, the rising share of the service industry in GDP has provided a prevailing service-dominant logic instead of the product-dominant logic, especially in developed countries. As in developed countries, the portion of the service industry in developing countries has an increasing acceleration in the GDP. The service industry has been becoming the subject of even more studies with growing importance. One of the most prominent actors in the service industry is also hotels. From the client's perspective, hotels service proposals are substitutable (Victorino et al., 2005). Among intense offers & presentations, customers' hotel choices are determined by hotels' service innovations. Also, from a practical point of view, hotels should create innovations that their competitors cannot obtain for at least a while to achieve a competitive advantage. Today, innovation does not mean only new products but also covers the service industry with the concept of service innovation (Barrett et al., 2015). The current study examined the factors affecting service innovation in this context. Considering Y and Z generations' increasing online tool utilization, hotels should benefit from information technologies and create service innovations with service providers. In this direction, managers should give more importance to information technology tools developing day by day. Hotel administrators may not know which information should be filtered and processed because of the intensive information flow created in tourism activities. Many IT tools will be used to create service innovations through co-production by hotels with service providers. In addition, cooperation with specialist service providers will also enable hotels to gain advantages in creating innovation processes by hearing the voice of customers. In this way, hotels will benefit from the expertise of service providers. Innovation occurring at the end of a laborious

process requires a multi-actor structure (Franco et al., 2019). Through the downstream supply chain service providers contributing to the innovation process, the businesses will learn customers' requests more quickly and develop new service innovations to answer these requests. By the information technology tools, actors in the production process may turn their passive roles into active ones (Lember, 2018). The study findings supported this view. It is observed that information technologies have a direct and -by adding co-production as a mediating variable- indirect effect on service innovation. Including service supply chain members such as tourism agents in the process contributes to improving innovation capacity (Nieves and Segarra-Cipres, 2015). As in the "Business to the Consumer" markets, the relationships cannot be developed quickly and easily in the "B-to-B" markets. Today, the relationship between the supply chain members is beyond the traditional seller and buyer relationship. The supply chain members contribute to the formation of the plus value throughout the chain. Thanks to the strong relations established with service providers, hotels might improve continuous improvements and service innovations, and thus this situation might also grant a competitive advantage.

In addition, this study primarily emphasizes the importance of service innovation to academics working in the fild of hospitality and tourism sector. There are still few studies on the effects of the rapid change in information and communication technologies on the accommodation and tourism sector. Considering global crises such as COVID-19, service innovations developed using IT tools have given companies a chance to survive. During this time, customers have adapted to digital technologies relatively and their wishes have begun to take shape according to this new normal. For this reason, academicians doing research on the hospitality and tourism sector should also attach importance to the subject and contribute to the literature with their studies.

### *5.3) LIMITATIONS AND FUTURE RESEARCH*

Several considerations should be taken into account when interpreting the findings and results of this study. Due to time constraints, the research data were collected only

through online surveys from hotel managers in Turkey. For this reason, different results may be possible if the study is carried out on sample groups in other countries. In addition, middle and senior managers, as respondents included in the study, were considered to know the relationship between the hotel and service providers, even if at a minimum level. However, there may be a possibility for participants to have insufficient knowledge about information technologies, service providers, and co-production. Since this situation was foreseen, basic information about these concepts was shared with the respondents in the survey study.

This study does not elaborate on which information technology tools affect co-production. This issue can be explored using qualitative methods in future studies. Future studies may investigate the effects of more different factors on service innovation than the current study variables. The moderator or mediator effect can be examined using novel research models created by adding various variables to the ones already used in this study. The current study addressed tourism agencies from the downstream service supply chain members, but further studies can examine co-creation in the service industry by including upstream supply chain members. In this study, we examined the impact of IT on service innovation only through online travel agencies. Research can also be conducted on the sample of technology suppliers in the tourism sector. In order to generalize on a global scale, the sample size can be expanded with studies covering different countries in the sample.

**Appendix A.** Measures' confirmatory factor analysis results

| Measures | Factor Loading | R Square | AVE | CR | Cronbach alpha |
|---|---|---|---|---|---|
| **Information Technology** | | | | | |
| With an external information network, we can identify our deficiencies in information technologies | 0.70 | 0.50 | | | |
| We know the information technologies used by our competitors | 0.69 | 0.47 | | | |
| We follow the industry closely in order to rapidly change our information technology when necessary | 0.81 | 0.66 | | | |
| The information technologies we use allow us to follow the developments in the sector | 0.84 | 0.71 | | | |
| We use information technologies that can respond quickly to environmental pressures | 0.87 | 0.76 | 0.74 | 0.96 | 0.97 |
| With the use of IT, we reduce our production costs | 0.88 | 0.77 | | | |
| The use of IT provides significant savings to our company | 0.94 | 0.88 | | | |
| Thanks to the use of IT, the efficiency of our company increases | 0.94 | 0.88 | | | |
| The use of IT increases the profitability of our company | 0.91 | 0.83 | | | |

| | | | | | |
|---|---|---|---|---|---|
| We use IT tools to improve the quality of products or services | 0.94 | 0.88 | | | |
| We use IT tools to respond quickly to our customers' requests | 0.92 | 0.86 | | | |
| **Co-Production** | | | | | |
| Our service provider(s) and our company work collaboratively | 0.92 | 0.85 | | | |
| Our company does adequate planning for collaborative projects before meeting with our service provider(s) | 0.93 | 0.86 | | | |
| Our service provider(s) clearly articulate their needs to provide the best possible service | 0.91 | 0.84 | 0.83 | 0.96 | 0.96 |
| Our service provider(s) contribute greatly to service processes | 0.90 | 0.82 | | | |
| Our service provider(s) participate in the service creation and delivery processes | 0.92 | 0.84 | | | |
| **Service Innovation** | | | | | |
| In recent years, our company has developed brand new services | 0.85 | 0.72 | | | |
| In recent years, our company has improved existing services and promoted the services | 0.89 | 0.80 | | | |
| In recent years, our company has repackaged existing services and promoted the services | 0.85 | 0.73 | | | |
| In recent years, our company has extended existing service lines and promoted the services | 0.90 | 0.81 | 0.75 | 0.94 | 0.94 |
| In recent years, our company has introduced new services that competitors do not offer in the market | 0.85 | 0.73 | | | |
| In recent years, our company has tried to reduce the risks of failure of new service development | 0.86 | 0.75 | | | |

**Appendix B.** Correlation matrix of variables

| | Co-Production | Service Innovation | Information Technologies |
|---|---|---|---|
| **Co-Production** | 1.00 | | |
| **Service Innovation** | 0.61 | 1.00 | |
| **Information Technologies** | 0.51 | 0.68 | 1.00 |

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