GLOBAL DISTRIBUTION SYSTEMS VERSUS NEW DISTRIBUTION CAPABILITY AND INTERNET OF THINGS

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Abstract:

In the present environment, to access data and processes, each airline provides its interface and establishes its process flows. Aggregation of direct connect platforms based on NDC, including LCC, necessitates a transformation in the traditional business model of global distribution systems. There is a relationship between airline service qualities and overall service quality and/or satisfaction and promoted NDC was and continues to be the foundation for developing new customer experience for air carriers' products throughout all retail channels, and even a tool for broadening air carrier internet sites' functionalities to all retail channels. The trend of integrating the Internet connectivity into previously unconnected "things" accelerates the demand for easy access to services via external APIs. The authors envisioned that the Tourism 4.0 technologies would play a key role in the process of evolution of the tourist industry and that asking AI assistants to book a holiday and display virtual reality amenities on a TV screen to help make an informed or inspired selection would soon be functional reality. Full implementation of the NDC standard and the necessity to integrate "4.0 technology" services in the booking processes was foreseen through the conducted survey as the opportunity for additional revenue. The utilisation of the survey's results could be seen as a starting point for uncovering and assessing features, attitudes, and behaviours in tourism industry for decision-making objectives of the various tourism companies. The paper's conclusion is stating that travel and tourism industries must explore ways to proactively overturn decades of outdated travel distribution processes, and even though the full use of ever-developing technology in the travel and aviation industry is still in the future, they must plan ahead for these significant turning points.

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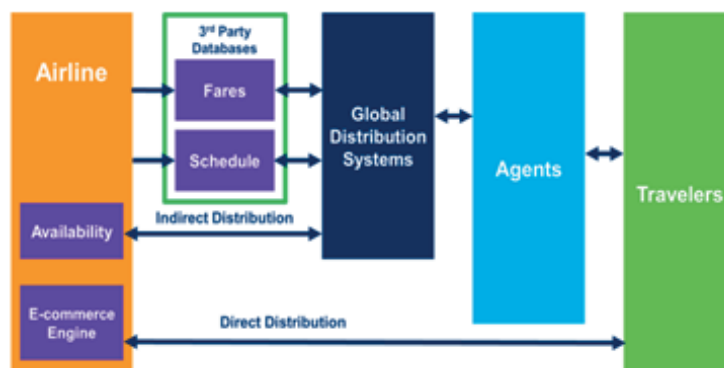
INTRODUCTION

Due to the accelerated development of information technologies, and the needs of today's global customer travellers, the International Air Transport Association (IATA) began to review the current distribution standards, on which existing Global Distribution Systems (GDSs) are based. GDSs and some airline systems still use teletype (TTY) messages (for communications between different CRS and GDS systems) and/or EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport) protocol for message format and syntax. This was the reason why IATA introduced the New Distribution Capability (NDC) project, which is based on the Open Axis XML (eXtensible Markup Language) schema that ensures robustness and transparency of data exchange. NDC is and will continue to transform the traditional distribution model, and enable airlines to create and distribute relevant offers to the customer regardless of the distribution channel (New Distribution Capability, 2017). Features that could be viewed and booked using GDS such as on-board amenities (e.g. meals, extra-legroom class seats) or ancillary services (e.g. extra bags, priority boarding), with NDC will be, and in part already are, directly offered to the customer. Some of the benefits of the NDC are access to full services of the airlines including low-cost carriers (LCC), transparent offer and shopping experience, facilitation of products and services differentiation, access to rich travel content etc. In order to realize the current situation, this paper researched air-travel customers' habits and needs, analysed the perspective of the NDC implementation and span of additional revenue possibilities in the tourism market through the Tourism 4.0 technologies.

The paper is structured as follows: In the first section, the Background on IATA's NDC initiative is introduced. The sections to follow review the related literature and work in the field of NDC implementations. The research is presented through methodology and results as the next section, and finally, discussion and conclusions are presented.

BACKGOUND

The concept of offering services through a cluster of cloud servers rather than a powerful but single mainframe has expanded the possibilities for air carrier distribution and many other industries (Vagdevi and Guruprasad, 2015; Bingemer, 2018a; Figure 1), thus the introduction of cloud computing could be considered as a milestone moment in air carrier service delivery history (Avram, 2014).

Figure 1. The landscape of airline distribution, pre-NDC (Durivaux, 2018)

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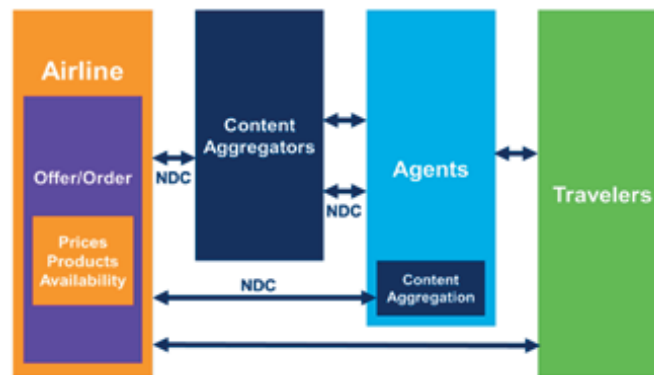
As creating and sustaining a centralised proprietary GDS architecture required large initial capital, cloud computing significantly reduced the distribution technology entry barrier (Vagdevi and Guruprasad, 2015). The ability to provide travel agencies with the Internet service, which is based on a cloud and which allows them to access air carrier distribution channels without having to install vendor-specific equipment in their offices, as was previously the case, enabled travel agencies to provide the offers of multiple air carriers, vacation and business rentals, car rentals, and other services - all presented from the cloud of a GDS provider (Bingemer, 2018a). From the standpoint of a travel agency, simplicity of access via the basic Internet browser reduced hostility to necessary changes and GDS made the various airline options as close to each other as possible for comparison, reducing the complexity of the search for travel agencies and agents themselves. Today, it is incorrect to assume that any of the GDS reflects the whole of all flights.

The expanding number of low-cost operators supplying additional products and services outside of GDS indicated that full-service carriers did not need to rely on GDS., The three key Gds`, Amadeus, Sabre, and Travelport, dominated the air carrier market distribution for a long time. However, with the emergence of the International Air Transport Association's (short: IATA) New Distribution Capability (short: NDC) and Direct Connect's, all of this changed (Bingemer, 2018b; Krishnamurthy & Krishnan, 2021).

Numerous airline clients have recognised that ancillary services could be beneficial in terms of creating a complete offer and generating additional profits, thus, airlines typically provide ancillary services first on-air carrier websites as in this manner, they have complete authority over their products (Bingemer, 2018b). Naturally, ancillary services offered are not harmonised among airlines as they are often used to differentiate an airline among others. In the case of ancillary services, GDS needs for standardisation and airline needs to offer diversity evolved into the NDC standard, which was firstly presented in the symposium in 2012 (World Passenger Symposium) as "IATA Resolution 787 on enhanced airline distribution" (Brecke and Steppler, 2013).

The relationship between air-line service qualities and overall service quality and/or satisfaction is the existing one (Štilić & Nicić, 2021) and NDC was marketed as the base for creating a new experience for the customers when buying airline products across all supply chains, as well as a tool for expanding the functionality of air carrier Internet sites throughout all retail channels (Westermann, 2013; Bingemer, 2018b). NDC could be observed as a mechanism to "place the airline at the heart of an interactive offer-generation process" (Jäckel & Maier, 2016).

The NDC process returns the offer creation process from the GDS to the airline companies (Bingemer, 2018a), and the air companies use NDC to aggregate all product components into an airline offer and deliver it directly (Figure 2). Implementation of the NDC standard takes the offer development process away from the GDS and back to the air companies, which then combine all product aspects into an offer. Given the importance of differentiating upmarket airline services, the time-to-market for ancillary services is crucial according to Avram (2017).

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Figure 2. NDC landscape of airline distribution (Durivaux, 2018)

The goal of NDC is for airlines to provide the greatest customer experience possible while also maximizing value-generating prospects from airline retailing. This demands a change away from legacy standards and "artefacts" like electronic tickets, e-miscellaneous documents (EMD), and passenger name records (PNR) and towards offers and orders similar to those found in the Internet sales (IATA, 2021a). By addressing the travel industry's current distribution limitations, such as product differentiation and time-to-market, access to full and rich air content, and finally, a transparent shopping experience, NDC enables the travel industry to transform the way air products are retailed to corporations, leisure, and business travellers (IATA, 2021b).

The focus of market stakeholders' communication on the NDC has changed from determining if a solution other than the GDS is required to how airline distribution must evolve in the light of digitalization, including a priority on distribution innovation (Bingemer, 2018a). Intending to provide travel agents with a "one plug" in connecting several Direct Connects at the same time (Davis, 2017), starting from 2015 (Taylor, 2017), Lufthansa Group, British Airways (BA) and Air France (AF) "had joined the approach to lever a GDS fee to compensate their distribution cost and to offer an NDC API at the same time" (Bingemer, 2018a).

To access its data and processes in the present environment, each airline provides its interface (API) and establishes its process flows. As each Direct Connect involves the adoption of a particular NDC connector, this results in a lack of spread throughout travel agencies (Bingemer, 2018a).

Even though the GDS remains the most important sole supplier of air carrier information, especially for international routes, we could see GDS separating as a single source of truth for mainland air travels, like in Europe, where LCCs are making significant sales and profits that are outside the GDS. This is not to say that the GDS has no future - but the market requires transformation (Bingemer, 2018a).

LITERATURE REVIEW

A literature review was conducted using Google Scholar, as a free to use database that offers a variety of all electronic resources on a specific topic. The search was limited to journal articles published in 2021 with search keywords new, distribution, capacity, and NDC. The search revealed around 143 publications, 14 of which are presented herein.

The appropriate circumstances, the right time, and the suitable fare were offered by Buyruk and Güner (2021) as three crucial decision-making aspects for a future booking. Muzaffer Buyruk and Ertan Güner concluded that technological limits, such as GDS and their access to passenger data, precluded airlines from creating customised offers for travellers (Buyruk & Güner, 2021). Recent technological advancements, such as the IATA's NDC, were cited in the authors' research as a major possibility for customers to discover specialised offers throughout the booking process. According to Juhasz (2021), with IATA's NDC, booking class and rates submitted into GDS will no longer be needed, and the objective of an airline company revenue management (RM) would change from maximising fares availability to producing optimised quoted pricing for each product sold by the carrier.

Even though Westermann (2021) states that modernization via IATA's NDC is getting popular and that NDC is being adopted by an increasing number of airlines, Krishnamurthy and Krishnan (2021) were examining the consequences of the transition from GDS to NDC and according to their study, NDC adoption has been too gradual, particularly among air carriers. Presently, most air carriers' ancillary pricing are manual, with prices usually defined by analysts via rival company benchmarking as well as past and present market research. The Kummara *et al.*(2021) ML model presented in their study is successfully embedded with marketing and distribution systems to apply the pricing structure of ancillary services and offers in direct, indirect, and systems with NDC.

Dadoun *et al.* (2021) believe that the use of recommender systems in the aviation sector is still in its early stages. In the context of IATA's NDC standard, they highlighted why this has been the concern and why it is expected to revolutionise. They made the argument that recommendation engines, as an element of the Offer Management System, are critical to providing customer loyalty because of their ability to comprehend and respond to travellers' needs across all customer experience during the customers travel, and they saw the use of latest innovations in AI Technology in the travel industry across contextually relevant and personally tailored offers to customers as an essential potential (Dadoun *et al.*, 2021). Wang *et al.* (2021) even provided an early optimization strategy in pricing "a-la-carte" and packaging a variety of flight and ancillary services. With the introduction of IATA's NDC, airlines would be able to advertise each and every rate from a continuous range according to Szymański *et al.* (2021). The idea of continuous pricing might boost sales by "capturing" more of the surplus value through the opportunity to provide more specific fares which are connected to the customer's ability and willingness to pay, as stated by Szymański *et al.*, (2021). The article by Stephan Bingemer and Ralf Vogler looks at how carriers may help with co-creation in the travel industry. The authors of the article give insight on the downfalls and obstacles that come with this process, making it an excellent real-world example in digital disruption and technology adapt to changes for all industry sectors, and they see the biggest challenge as a need to organise the shift from aged to modern systems (Bingemer & Vogler, 2021).

Daft *et al.* (2021) propose design replicating online marketplace methods as a promising technique in carriers' attempt to reclaim income and preserve the significance in a digitalizing society. The article synthesises important offer management principles, highlights carriers' primary hurdles to offer managing acceptance, and proposes requirements for carriers' shift from simple flight suppliers to airline merchants (Daft *et al.*, 2021). According to Oancea (2021), the influence of COVID-19 on the industry has underlined the need to develop new methods of sales services that are less dependent on historical information and more responsive to the observed reality of purchase behaviour and competitive environment. The author states that the carriers will have to react immediately with inventory modifications in the COVID-19 era, as well as to better analyse customer behaviour concerning a purchasing intention and target each customer with an optimal offer in real-time.

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According to Darrow (2021), the tourism industry needs to step away from controlled learning that is based on large amounts of data and towards structures that acquire knowledge with a few records, as well as away from centrally managed (even if cloud-based) machine learning and towards distributed AI, and away from recommendation systems and towards marketplace strategies. The article presents the belief that the procedures have taken a major step with the modern generation of AI, with recommendation systems learning client preferences in order to personalise services better. This is considered ideal for IATA's NDC initiative for the airline sector (Darrow, 2021), and the tourist sector as a whole. The author foresees different shifts to hotels, rent-a-car companies, tourist attractions, tours and events, through distributed AI and different market approaches.

NDC IMPLEMENTATION

The deregulation of full-service airlines' services, which began approximately 15 years ago in order to be competitive with LCCs, added complexity to travel planning. Since then, airlines have been in control of generating the offers themselves, through their direct selling and now with NDC, benefiting from extra information from the search context on what the customer is searching for. Thanks to the implementation of the Standard, it is now feasible to integrate NDC-enabled content with the airline's retail system and offer/order systems, ensuring fewer and more relevant offers and that the offer is even more tailored to the needs of the customer in accordance with the airline's merchandising goal.

Full implementation of the NDC standard could be seen as the opportunity for additional revenue for local and global OTA, as well as for the traditional travel agencies. The application of the NDC standard could also be seen as a help for individual travel agents and the whole tourism industry in understanding the reality of the positive changes. Some of the benefits are more obvious than others, but all of them are relevant to all included in the travel process.

It becomes considerably more efficient for airlines adopting NDC to just provide new ancillary offers since they can categorise them with almost no restrictions and/or without having to comply with the standard SSR codes. A European airline, for example, has used this chance to present flavourful and more tempting in-flight dishes than the conventional IATA meals, such as "Gluten-free". This freedom to experiment may be applied to offer and characterise all sorts of services; nevertheless, certain airlines might very well take this liberty to innovate to its final extreme like selling bags checked in by the kilogram, new package of services including baggage weights and seats or check-in and security fast-track.

NDC's core goal has always been to make the selling of airline tickets easier. If a consumer wishes to cancel an order placed on an airline website, the process of sending an email, phoning the helpdesk, or talking with the venture is unnecessary - in the digital age, a single "cancel order" button streamlines this process. In the travel sector, on the other hand, the great majority of travel sellers have had to cope with complicated processes for decades, needing to memorise four separate cryptic orders to cancel a flight ticket, depending on whether cancellation is made after the reservation, during the void period, or after completion of the reservation. NDC offers this "cancel button" for travel, eliminating the need for the numerous command lines and making transactions – simplified. It also entails being able to draw from a larger range of employees, allowing them to do such procedures more swiftly and with greater flexibility. All calculations in NDC are handled by the air carriers: there is no possibility of a travel agent miscalculating refunds and risking charges from an airline when all they have to do is press a button. This NDC feature saves travel companies a substantial amount of money and processing time.

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Airlines can determine pricing in real-time, dynamic pricing, using NDC. In comparison to pricing computed using outdated technologies, this should benefit travel companies. One European carrier, for example, generates its seat rates dynamically, which means that costs fluctuate based on a range of parameters such as passenger demand and trip context.

Additional details, such as "Did you know that opting for this higher cost fare family as opposed to economy class will earn you Silver rank on your FF program?" might be the determining factor in convincing a customer to book. There are customers who'd like to know, "How many miles will I get with this booking?" (Raffin, 2021). So far, the only option for the travel agent has been to visit the airline's website, locate the miles calculator, and re-enter the origin, destination, class, and tier status. This is both inefficient and impractical.

Airlines may use NDC placeholders to describe their fares and services to travel vendors and consumers upfront and many are actively implementing this feature in which the offer can be contextualised and brought to attention by the passenger or travel agent. By simplifying promotional messages, as a result, promotional information such as free upgrades and branded in-flight services would no longer be missed because they will be delivered directly to the target audience when they are needed and expected.

As an example, we could consider a long-haul journey with four cabins: Economy, Premium Economy, Business, and First. While some airlines grant universal upgrades to all passengers throughout the season, others are more strategic. The former has a habit of flooding the upgrade area of the lowest Economy fare with up to nine additional options: luggage, limited or unlimited fares within every upper cabin class. On the latter, certain carriers, for example, consider the context: if no cabin class is specified as a search criterion, the carrier may conclude that the customer is seeking the cheapest tickets. As a result, the carrier will not offer the customer an upgrade from Economy or Premium Economy to First Class for thousands of euros (Raffin, 2021). Curating the number of offers that are presented is also an excellent technique to create a pleasant traveller experience in the digital medium.

The ability for airlines to provide local language explanations of their offers and fare conditions is a rarely used NDC capability. Aside from the fact that terms and conditions must be in local languages in some countries, many travel providers are not fluent in English. Having localised text for travel sellers and travellers, especially for airlines that provide extensive information on their fare groups, would allow them to deliver a better service to customers and travel marketers while remaining consistent with the airline's image. At present moment, this option exists and is being used only by several airlines.

Airlines can also use these text frames to advertise business specials: "Did you know that thanks to our partnership with agency 123, you can enjoy an 8% reduction on our general rate and another week to pay for the ticket?" These features could allow the company to demonstrate its additional value while simultaneously promoting the airline.

For understanding that investments in NDC are not there just to display some text and Frequent Flyer (FF) information, one needs to look beyond (Raffin, 2021). The fact that airlines may "push" messages to travel vendors or travellers throughout the process is already a significant change in comparison to the traditional EDIFACT market. The fact that this messaging may be dynamically computed extends the opportunity to interact with customers, and from the real-life examples, many sectors such as Solution Management, Retail Customer & Traveller Solutions and Retail could widely benefit, as presented by Raffin (2021).

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In addition, it is critical to supply a Frequent Flyer identity as early in the booking procedure as possible, rather than only after the booking is almost done, as is typically done with outdated EDIFACT systems. When creating an offer, Frequent Flyer tailored offers and Frequent Flyer mileage accrual information would allow certain airlines to provide a discount or apply unique conditions to individual accounts, which was technically impossible with the outdated communication protocol. Customers could receive additional details from travel providers that use NDC, such as how many Frequent Flyer points they will earn with particular trips, so the process of selecting a flight could greatly differ. A prominent Southeast Asian airline, among others, has adopted the concept: they provide the mileage gain value right in each deal summary, as early as in the shopping or upgrading process.

Some of the benefits of adopting and implementing NDC exist today and are already available through the GDS platforms and the examples of the benefits are already here, documented and currently available – so travel sellers could start benefiting from them even today (Raffin, 2021).

Travelport was the first GDS to reach level 3 compliance, which allowed it to act as an aggregator for NDC services. Its first NDC solution, intended for airline businesses, was released in 2017 via a roadmap. Amadeus asserts that they would integrate their content, including NDC, well within the booking system for the customers' easier use. Amadeus believes that the NDC is merely one piece in a larger transformation that the whole travel industry is preparing for. As part of its 'Beyond NDC' program, Sabre Corporation has also obtained level 4 certification, and improving its capabilities for travel providers is a result of this (Krishnamurthy & Krishnan, 2021).

RESEARCH METHODOLOGY

Data collection

The advancement of digital media and technology, primarily the Internet and social media, is providing the travel industry with a variety of new opportunities. The travel industry, including carriers and accommodation providers, have been able to handle their distribution network in a much more productive and cost-effective manner as a result of the most recent technology breakthroughs. Airlines' capacity to evaluate performance across channels has increased due to the shifting environment of travel online retailing and the prevalence of IT systems that capture, register, and interpret information in a variety of manners. As they optimise communications and transactions, airlines are frequently able to swiftly modify offers, and their pricing is generally dependent on a number of scenarios and circumstances (Camilleri, 2018).

The research on passenger habits and needs during booking processes was conducted with the goal to obtain data on span of possibilities for additional revenue during initial airline reservations.

Question selection was derived from the concept of the research subject and the questionnaire itself was in electronic format, where the interviewer filled out the form.

Data for the study on passenger needs and habits in the reservation process was gathered in December 2021 by primary data collection method through the survey. The study involved answers from 388 random real-time passengers in Belgrade Nikola Tesla airport check-in zone, travelling to different destinations with different carriers.

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The survey research in this study was observed using a comparatively high number of pre-determined samples of respondents. The planned selection was solely to identify a physical place for conducting a survey, in order to interview persons who travel by plane. Respondents were selected at random from a specific location (the Belgrade airport check-in zone) to represent the general public's perspective on the matter.

The survey was conducted methodically, using face-to-face interviews and a survey that required respondents to answer pre-determined questions. The approach resulted in the simultaneous gathering of mixed method data in the model, with both open and closed-ended questions and various types of information. The survey was designed on the premise that gathering a variety of data sets is the most effective way to gain a comprehensive picture of a research subject (Creswell, 2014). The type of information gathered by the survey is personal information, past and prospective behaviour and attitudes.

The results of this survey can be utilised in scientific study, but they can also be used in business research to uncover and assess features, attitudes, and behaviours in tourist industries for decision-making objectives.
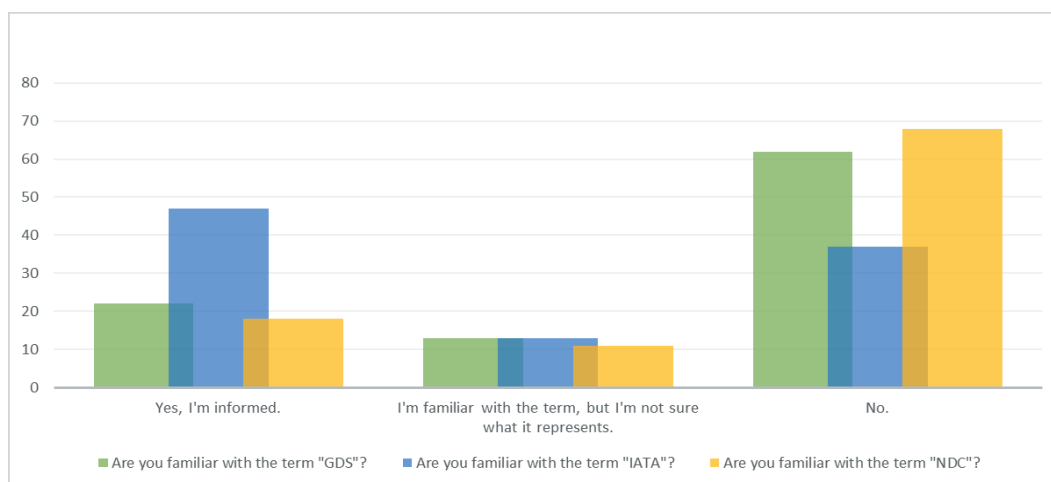
Result analyses: Passenger habits and needs

The study involved answers from 388 subjects, out of which the majority of respondents were female (76.3%), as ones who were responsible for the booking process for the whole party. The age of survey participants ranged from 18 to 65, with a mean age of about 36 years old.

All respondents in the survey have booked airline services before, apart from one whose booking and air travel were the first for the group.

The fact that the majority of the respondents were not familiar with the terms GDS, IATA and NDC, respectively 63.9%, 38.1% and 70.1%, presented in Figure 3, provided their impartial answers considering the motivation of the survey.

Figure 3. Knowing the terms GDS, IATA and NDC

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Respondents stated that when it came to their previous travels, by far most used booking channel was the airline's website (67%), followed by global OTAs (21.6%), traditional travel agencies (9.3%) and local OTAs (2.1%). The distribution of the answers is presented in Figure 4.

Figure 4. Count of "How did you usually book flight tickets in the past?"
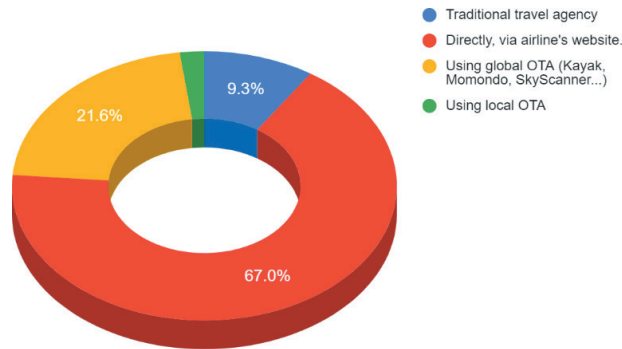
The price was cited by 304 (78.35 percent) respondents as the primary reason for using their preferred reservation channel, in an open question/answer form. Other responses included statements like booking safety, speed of reservation, simplicity.

Adding ancillary services during the booking process (presented in Figures 5 and Figure 6), like additional baggage (38.1%), preferred seat (15.5%), on flight services (4.1%), transit services (4.1%) and post-flight services (6.2%), with 42.3% of the respondents stated that they use the airline's loyalty programs, clearly implied that there were plenty of opportunities for NDC implementation and revenue management (RM) benefits. As a considerable percentage of the respondents in the survey did not use ancillary services, one could ask: Were the ancillary services even offered on time?

Figure 5. Ancillary services and booking habits

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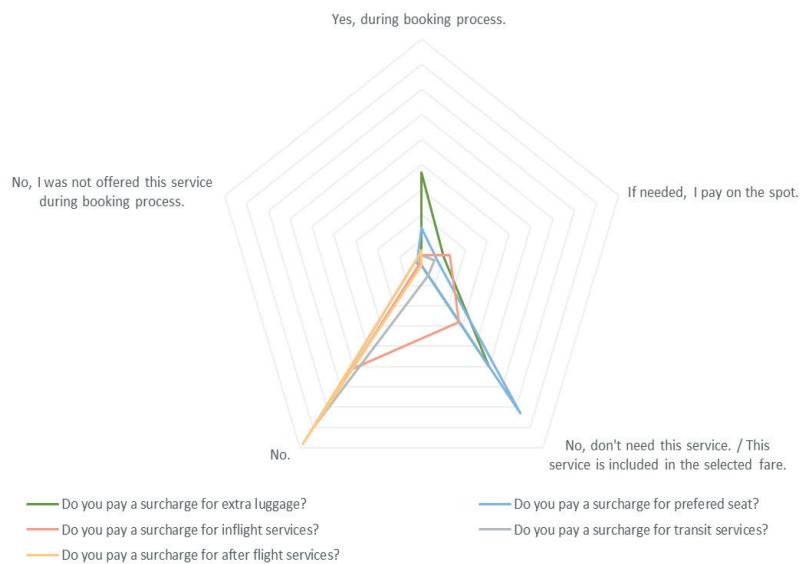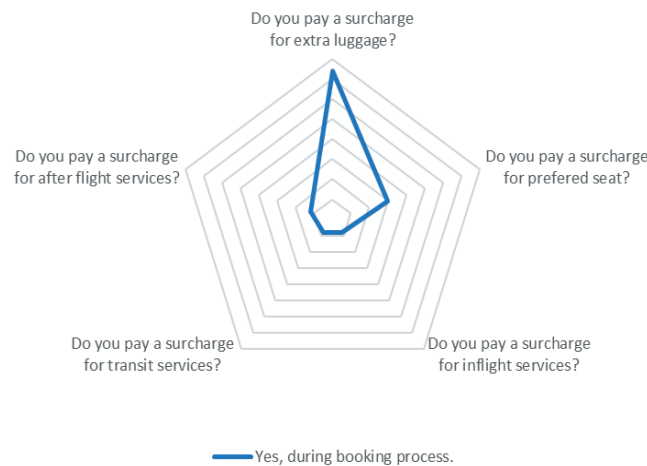
Figure 6. Distribution of ancillary services booked during the reservation process

The booking channel that respondents stated they would use for future travels did not differ much from their past selection, but there were still some changes and the distribution of the answers is presented in Figure 7. When comparing the former and future methods of booking a journey (Figure 4 and Figure 7), that is the channel for bookings, 40 respondents (10.3 percent) changed their minds. Seventy percent of them (28 respondents) indicated a shift from OTA to direct booking through the airline's website, while 30 percent (12 respondents) said that their future travel reservation channel would be OTA rather than the airline's direct channel. Interestingly enough, in both cases of change of preference, respondents stated that the decision was made in the current Covid era because, in their opinion, altering the channel of the reservation would make it easier for them to modify the reservation, cancel a trip, or claim a refund. In the open question/answer form that followed, participants stated that the reason for this change emerged in the Covid era and the main problems were flights cancellations, travel and borders restrictions, which all resulted in a need for reservation modifications and refunds.

Figure 7. Count of "In the future, how do you intend to book flight tickets?"
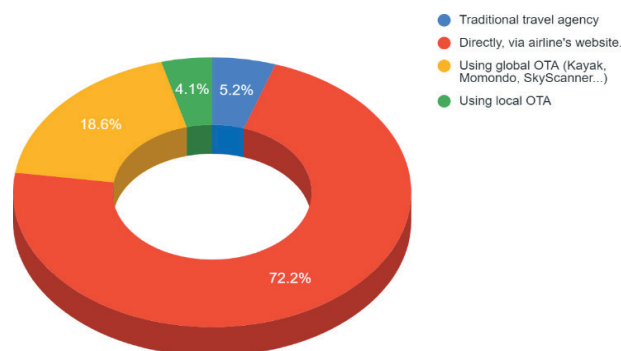
The research analysis resulted in important criteria for possibilities and directions of future development in distribution capabilities and showed the passenger need for the application of NDC standard in terms of local and global OTA, as well as the traditional travel agencies to stay competitive.

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DISCUSION

The Internet of Things (IoT) concept, AI, Big Data, VR, Augmented Reality (AR) and Blockchain are the most influential technical innovations (Gasiorowski-Denis, 2016) of the present and future of the travel industry. The trend of integrating the Internet connectivity with previously unconnected "things" accelerates the demand for easy access to services via external APIs. High-tech is expected to take an active role in the development of the tourism industry: robots carrying out health and security checks, employee-free front desk services, check-in/out aided by Artificial Intelligence (AI), self-service rentals, etc., many of which have already been achieved in COVID-19 era.

High-tech solutions are connected to a network that is relevant to a single passenger and protocols or systems that can handle traveller identification, travel information, location information, payment method, personal details, satisfaction records and engagements in a single logic framework – to be required. As the usage of Industry 4.0 technologies expands, particularly in the tourism industry, a standard that ensures new possibilities is necessary. The NDC and Direct Connects are appropriate for this scenario since they are significantly closer to all high-tech infrastructures. The standards or systems must be adaptive enough for it to serve operations not just in the travel industry, but in all the industries that influence the overall experience of a traveller (Bingemer, 2018a).

The most-used channel for air-travel related reservations, as per conducted research, corresponds to the increasing number of airline's general efforts on modernization via IATA's NDC standard (Westermann, 2021). To stay on the market, this occurrence represents both a need and opportunity for GDS' to transform.

When observing that the price was cited by 78.35% of the respondents as the primary reason for using their preferred reservation channel, followed by booking safety, speed of reservation and simplicity of the reservation process, we could conclude that providing an optimization strategy in pricing (Wang *et al.*, 2021) with the introduction of IATA's NDC, the providers could profit from being able to advertise each rate from a continuous range (Szymański *et al.*, 2021) and from the opportunity to provide more specific fares which are connected to the customer's ability and willingness to pay (Szymański *et al.*, 2021).

With only a small number of survey respondents (10%) changing their minds about booking channels for reservations in the future, we could agree with the argument that Offer Management Systems with recommendation engines are critical to providing customer loyalty (Dadoun *et al.*, 2021).

If we observe three crucial decision-making aspects for the future booking: the appropriate circumstances, the right time, and the suitable fare (Buyruk & Güner, 2021), at present, the opportunity of NDC implementation and RM benefits are not yet met. Presented in Figure 5 and Figure 6, a considerable percentage of the respondents in the survey did not use ancillary services and therefore we are asking ourselves whether this is a tech issue. The latest innovations (Industry and Tourism 4.0) made possible by NDC in the travel industry across contextually relevant and truly personally tailored offers to customers (Dadoun *et al.*, 2021) is yet to be for air carriers, OTAs, traditional travel agencies and local OTAs.

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Figure 8. The Internet of things (Yankova, 2020)

A widespread use of 4.0 technologies in the future (Figure 8), like airline virtualization (Castiglioni *et al.*, 2018) requires the full implementation of a standard that is both flexible and simple to adopt. To realize the benefits of such a distribution system, airlines must first connect their IT systems internally to provide the ancillary services that they may already sell through NDC-based Direct Connects (Bingemer, 2018a). Travel and tourism industries must explore ways to proactively overturn decades of outdated travel distribution processes (Camilleri, 2018), and while the use of 4.0 technology in the travel and aviation economy is still in the future, they all must plan ahead for these significant turning moments.

With Big Data, hi-tech-based customer care solutions such as digital assistants, voice analytics, AI, and machine learning, inter alia, are assisting companies in meeting rising consumer demands while also gaining loyal clients. Once it comes to high-touch services, business intelligence technologies can assemble and convey the exact combination of information needed to attract a customer in purchase.

CONCLUSION

The implementation of Direct Connect to the GDS providers' system portfolios is more than just advanced technologies. Grouping Direct Connects (including LCC) that are based on the NDC, could very well necessitate a shift from the traditional Global distribution business strategy, because NDC is "just" a standard rather than a software or a specific product. NDC requires the tech-solution providers to develop products based on it. These partners might include both GDSs and newcomers to the distribution field. NDC is indeed very attractive to newcomers to the sector since it establishes a norm that could be used to synchronise information for all Direct Connect carriers and to maximise travel company performance.

Terms of the Internet technology today enable effective aggregation of many products from various sources based on decentralised applications. While a Direct Connect may be considered as a technological segmentation, this does not mean going back to the CRS era because contemporary technologies have overcome prior faults (Bingemer, 2018a).

GDS companies are conscious of the fact that not every air carrier will fully migrate to the NDC, and that some will do so gradually, so the GDS will continue to play a vital part in the travel industry's future. However, as more airlines use NDC to their benefit, it is currently unknown whether GDS NDC aggregators would provide carriers full access to customer data (Krishnamurthy & Krishnan, 2021).

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It is probably a good idea to remember that a PNR is the traveller's property, not that of a GDS. In perspective, aviation pioneers could lead focus groups to analyse the vast volumes of data being collected and/or push start-ups to discover how everyone may benefit. The aviation market is completely underserved in terms of box mobile, chatbots, and AI (Misquitta, 2019). To ask Cortana, Siri, Alexa or Google Assistant to book your holiday and display Virtual Reality (VR) amenities on your mobile or TV screen to help you make an informed or inspired selection - is becoming a functional reality. Targeted directly at a modern consumer, the possibilities of distribution process enabled by the NDC and the competitiveness of the tourist offer are determined by the extent of inclusion of the Tourism 4.0 concept, as it portrays an evolutionary process in the tourism industry.

Nowadays customers want personalized experiences throughout every stage of their journey, so companies are using the technology to meet that desire. The objective is to identify the appropriate technology and exploit it at the right moment, in the correct manner, and by the relevant players, since exceptional customer experiences originate from the strategic introduction of high-tech supported by human touch (TELUS International, 2021).

The fact is that a high-tech strategy will not ensure success on its own – web searches, online customer support platforms, and keyless accessibility will not create an experience that will cause consumers and guests to enthuse on their trip, hotel stay, or rental reservation. They will improve customer experience by minimizing customer time and energy, and they will hardly produce brand advocates. Travel companies could do so by making quality, old-fashioned human relations, especially if things get particularly sensitive and complex.

Customers, no matter how tech-savvy they have got, still want a personal touch- to create a close relationship in cyberspace, when dealing with their preferred products and companies. This is especially true for the modern tourist, who places a premium on the experience. Generation Y values experience three times more than obtaining a good deal, and one-quarter of Millennial tourists would rather spend money on an experience or event than a product (TELUS International, 2021), so in today's world, choosing between high-tech and high-touch is thankfully not a necessity.

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Acronyms

- AI - Artificial Intelligence
- API - Application programming interface
- AR - Augmented Reality
- EDIFACT - Electronic Data Interchange for Administration Commerce and Transport
- EMD - E-miscellaneous documents
- FF - Frequent Flyer
- GDS - Global Distribution System
- IATA - International Air Transport Association
- IoT - Internet of Things
- LCC - Low-Cost Carrier
- NDC - New Distribution Capability
- PNR - Passenger name records
- SSR - Special Service Request
- TTY - TeleType
- VR - Virtual Reality
- XML - eXtensible Markup Language

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GLOBALNI SISTEMI DISTRIBUCIJE U ODNOSU NA NOVE MOGUĆNOSTI DISTRIBUCIJE I INTERNET STVARI

Rezime:

U sadašnjem okruženju, svaka avio-kompanija obezbeđuje svoj interfejs i uspostavlja načine funkcionisanja za pristupanje podacima i procesima. Agregacija platformi za direktno povezivanje zasnovanih na NSD, uključujući NP, zahteva transformaciju u tradicionalnom poslovnom modelu globalnih distributivnih sistema. Postoji odnos između kvaliteta usluga avioprevoznika i ukupnog kvaliteta usluge i/ili zadovoljstva, a unapređeni NSD je bio i nastavlja da bude osnova za razvoj novog korisničkog iskustva u vezi sa proizvodima avio-prevoznika u svim malo-prodajnim kanalima, pa čak i alat za proširenje funkcionalnosti internet sajtova avio-prevoznika na sve maloprodajne kanale. Trend integracije internet konekcije u ranije nepovezane "stvari" ubrzava potražnju za lakim pristupom uslugama preko eksternih IPA. Autori su predvideli da će Turizam 4.0 tehnologije imati ključnu ulogu u procesu evolucije turističke industrije i da će traženje pomoći od veštačke inteligencije da nam rezerviše odmor i na TV-u prikaže sadržaje virtuelne realnosti , kako bi nam pomogla da napravimo informisan i inspirisan izbor, uskoro biti funkcionalna stvarnost. Potpuna implementacija NSD standarda i neophodnost integrisanja usluga "4.0 tehnologije" u procese rezervacije je kroz sprovedeno istraživanje predviđeno kao mogućnost za dodatni prihod. Korišćenje rezultata ankete može se posmatrati kao polazna tačka za otkrivanje i procenu karakteristika, stavova i ponašanja u turističkoj industriji u cilju donošenja odluka različitih turističkih kompanija. U zaključku rada se navodi da industrije putovanja i turizma moraju da istraže načine da proaktivno preokrenu decenije zastarelih procesa distribucije putovanja i iako je potpuna iskorišćenost tehnologije koja se stalno razvija u idustriji putovanja i avioindustriji još uvek u budućnosti, moraju unapred planirati ove značajne prekretnice.

Ključne reči:

Globalni distributivni sistemi,
Nova sposobnost distribucije,
Turizam 4.0 tehnologije.