



## **New Distribution Capabilities in the Egyptian Travel Agents: Measuring the Technology Acceptance and Analyzing the Factors that Influencing the Usage**

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### **Abstract**

The travel industry has undergone significant changes in recent years with the rise of a new concept for selling tickets and airline services. New Distribution Capabilities NDC is a technology platform powered by IATA and developed by airlines that enables travel agencies to access rich content and services directly from airlines. This research aims to measure the NDC usage acceptance in Egyptian travel agents comparing to GDS usage, by appointing Technology Acceptance Model TAM Theory as a base. TAM aspects are integrated with other constructs which is retrieved from the factors that affecting the GDS usage. According to this model, Egyptian travel agents agreed with that NDC is ease of use and do not have technical obstacles of training their staff on its implementations, however they still uncertain about the ability of NDC in all other factors compared with GDS system and they are not ready yet for the complete transmission from GDS into NDC. Then, the study employed Importance-Performance Analysis IPA, to analyze Egyptian travel agents' perceived importance and operation of New Distribution Capabilities NDC. The IPA grids have illustrated that NDC has had a positive effect on travel agencies, providing them with more options, better pricing, improved customer experiences, and allows those who have the potential to be flight aggregator. However, NDC has also presented challenges for travel agencies, such as uncertainty about adoption to new concept and how good is as GDS as accurate and ease to use. Overall, the results suggest that NDC has the potential to enhance the operations of travel agencies but also requires careful consideration and planning.

## Introduction

In nowadays extremely opportunities and highly competitive environment, travel industry has undergone profound changes which is reshaping how airlines perform business. (IATA, 2018).

Prior to the mid-1980s, travel agencies utilized Computer Reservation System CRS as a conventional method for exchanging travel information with airlines. Then in the latter half of the 1980s, CRS gave rise to Global Distribution Systems GDSs, which offered a fast, efficient, and secure way of accessing travel and tourism information and booking through the internet or direct connection. GDS works as an intermediary between travel agencies and the airlines. (Kays and Krishnan, 2021). Typically, GDSs as Amadeus, Galileo, Sabre, and Worldspan enable users through a worldwide computerized reservation network to book hotel rooms, rental cars, and airline tickets (Budiasa et al., 2017). In this recent period of time, the number of passengers depending on internet web sites for searching and planning their flights has been increased, which encouraged airlines to more and more sell and distribute their tickets through the internet (Ziegler et al., 2017). As a response to the growing needs of both airlines and passengers, IATA officially endorsed its project, The New Distribution Capability NDC, during the World Passenger Symposium WPS, which took place in Abu Dhabi in 2012. The primary goal of the NDC initiative is to give airlines back control over their offerings by allowing them to create dynamic ancillary package deals and modify personalized offers based on consumer preferences and market demand, as opposed to relying exclusively on the capabilities and constraints of GDSs. (OAG,2023). NDC permit airlines to introduce a rich content and ancillaries direct to travel agents, travel management company or any other flight resellers (Brecke and Stepler, 2013). NDC platform provides travel agencies with a wealth of information, including flight schedules, seat availability, seat pricing and allowing them to provide their customers with more options and a better travel experience (Westermann, 2013). However, despite the different advantages of NDC platform for all pillars of the travel industry, there is a lack of research on its effectiveness for travel agents in particular. This study aims to address this research gap by investigating the NDC usage acceptance in Egyptian travel agents comparing to GDS usage.

Based upon the forgoing, an exploratory study was conducted by the researchers with managers and executives in different Egyptian travel agents, so as to determine the way that Egyptian travel agencies apply the NDC and elucidate the research problem. The researchers found that only two Egyptian travel agencies decided to take the initiative and play a new role in this new airline distribution platform. First one is NSAS travel which announced that the company became the first Egyptian travel agency has the license 4 of IATA NDC with a cooperation with air Cairo as an Egyptian LCC airline, and launched its platform (NDC port) to be available for travel agencies as same as GDSs' systems (ndcport.com). Second one is wonder travel which launched its NDC portal as a B2B platform for Egyptian travel agencies and described it as a national distribution channel (ndceg.com). The researchers held personal interviews with those in charge of the NDC platforms at Wonder and NSAS companies as they are the major NDC flight aggregators in Egypt in order to get to know practically the characteristics and capabilities of the NDC platforms that the Egyptian travel agencies depend on. Depending on these interviews, the following questions are constructed:

1. What distinguishes NDC and GDS from one another?
2. What advantages does NDC offer to travel agencies?
3. What challenges need to be taken into account?
4. Do travel agencies in Egypt have to transmit to the NDC?

## Research Objectives

1. Measuring the NDC usage acceptance in Egyptian travel agents comparing to GDS usage.
2. Analyzing the importance and performance of the factors that influencing the NDC usage as perceived by travel agents.

## Literature Review

### 1- Air Travel Distribution from Historical Perspective

Researchers try to clarify the history of Air Travel Distribution, in order to make it possible to comprehend the players involved and the present status of NDC adoption in general.

Flight distribution automation (Computer Reservation System): IBM and American Airlines collaborated to create the first computer reservation system CRS, known as SABRE, in 1964. American Airlines ticketing agents were able to browse for flights, make reservations, and confirm them using computer terminals because to SABRE's usage of digital inventory. Passenger name records PNRs were made accessible and the mistake rate was reduced by the system. (Kays and Krishnan, 2021).

Broad applicability of customized versions of CRSs: Nearly all of America's major airlines began using specially designed CRSs in 1971 (Warner et al., 2010).

Travel agents using terminals: Travel agencies were provided with terminals for semi-automated flight booking by CRS providers in an attempt to implement their systems in the 1970s. For a monthly subscription fee, carriers offered travel agencies long-term contracts as well as hardware, software, and training (Altexsoft 2023).

The airline deregulation: In the United States, airlines were allowed to determine their own ticket prices in 1978, free from governmental restrictions. Due to this, the demand for CRSs amongst travel agencies increased and the travel market was impacted.

Widespread use of CRS: By 1989, the majority of airline tickets were purchased through travel agencies, and a significant portion of travel agents had contracts with CRS providers. (Altexsoft 2023).

Transformation to GDS: The CRSs started operating as separate companies in the late 1990s. European airlines developed Galileo CRS in 1997 to rival Sabre (Warner et al., 2010). Then, in 1999, Amadeus CRS was established, and in 2000, Sabre separated from American Airlines. At the moment, Sabre, Amadeus, and Travelport are the main GDSs. (Budiasa et al., 2017).

Transition to Web Distribution: As the internet grew in popularity in the twenty-first century, airlines started to create websites to showcase their goods and services. Carriers also made investments in metasearch and booking portals like Orbitz and Skyscanner. Travel agencies were given the software by GDSs to create their own websites. Thus, online distribution opened up new avenues, and Online Travel Agencies OTAs appeared. Airlines can now directly provide personalized content to online travel agencies OTAs, travel management companies TMCs, and metasearch engines. (IATA, 2023).

## **2- The Concept of NDC**

'NDC is going to completely reformulate the way people travel and airlines run their businesses, and maximize their profits and revenues in general. Ancillary services are considered a sore point in particular where premium airlines struggle' (Oancea and Horga, 2018). Recently, The 1980s-era of Electronic Data Interchange for Administration, Commerce, and Transport EDIFACT communication protocol is being replaced by NDC, which is regarded as a new communication protocol based on Extensible Markup Language XML (Verteil, 2022). The way that travel industry partners and airlines exchange data become coordinated by the XML protocol, which is considered markup language for structured, arranged, and easily readable data. Regardless of the particular systems each party uses, this standardized format guarantees that everyone involved in the distribution chain can comprehend and process the exchanged information (OAG,2023). Functionally, EDIFACT is considered a constraining technology when it comes to unbundled fare structures. Therefore, it does not provide travel agents with clear and convenient access to the same goods, extras, ancillaries and data that are offered on airline websites because it delivers information like prices or flight times as a limited product in the form of a static display (Triometric, 2023), but XML is a set of codes that describes the text in a digital document. In other word (XML) concerned with how information is organized, not how it is displayed (Roche, 2023). So, it allows airlines to display their contents with rich details in a very flexible and powerful way (Triometric, 2023).

Moreover, NDC uses Application Programming Interfaces APIs to make it easier for airlines, travel agencies, and other travel-related businesses to share data streams and functionalities (IATA, 2023). APIs are considered as a collection of guidelines and procedures that let various software programs and applications contact to one another. By eliminating the need for intermediaries as Global Distribution Systems GDSs. Airlines can directly link their inventory and reservation systems with platforms used by travel agencies or other distribution channels through APIs. A major improvement over the legacy EDIFACT protocol that has been in use for the past 40 years, airlines can now share their product offerings directly from the airline Passenger Service Systems PSS to a B2B platform or Airline Agent Portal/OTA by utilizing APIs. In NDC platform, the combination of XML and API-based communication, augmented by third-party data providers, contributes in adding richer content, personalization, and dynamic pricing in the airline distribution process (www.OAG.com).

## **3- NDC Booking Flow**

Within a conventional booking flow, GDSs can construct an offer using fragments of flight data. GDSs operates this by using the availability information from an airline's CRS, rates from the Airline Tariff Publishing Company ATPCO, and schedules from the OAG or Cirium databases. Currently, by using the NDC approach, carriers can take control of their products and modify offers in response to customer needs besides market trends and demand. Airlines have the option of distributing their offers directly or through intermediaries (aggregators and GDSs) that can deliver NDC products (IATA, 2019b)



Figure (1) Conventional booking flow with EDIFACT and NDC APIs.  
Source: Altexsoft (2023).

#### 4- The Transformation to NDC

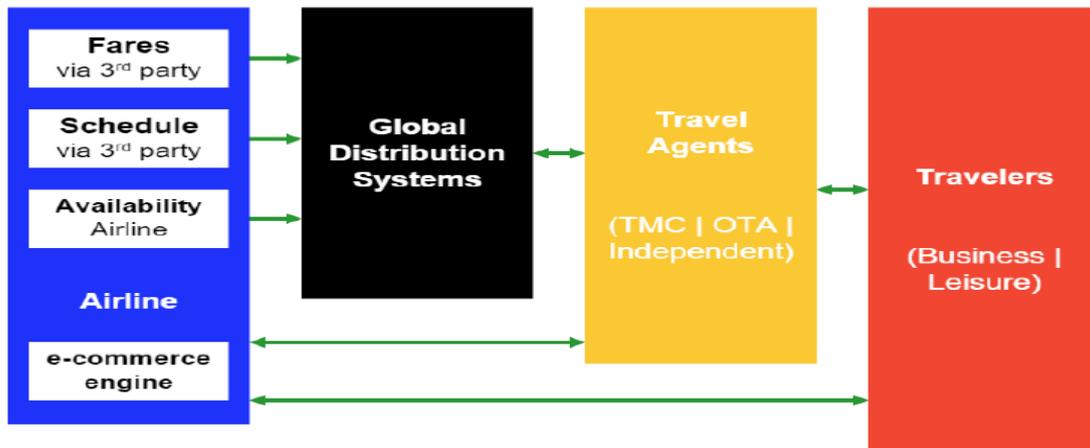


Figure (2) Indirect flight distribution before NDC  
Source: IATA (2019b)

According to figure (2), prior to the inception of the NDC concept, conventional booking flow of GDSs were based on creating the offer, getting fares, availability, and business rules from the airline or any third parties like Airline Tariff Publishing Company ATPCO. Moreover, the way of selling seats depends on the creation of a PNR by GDS which originally belonged to the travel agent while the airline which own the seat is unaware of the end customer until the end of transaction. Which mean that GDSs (Amadeus, saber, and travel port) have the main power to control the game (IATA, 2019b). Figure (3) illustrates that the new concept NDC enables airlines to manage and offer their products by themselves directly to travel agents and the end travelers or even through aggregators, which mean that OTAs and other travel sellers can access NDC content in three different methods: directly through an airline's NDC API, through NDC aggregators, and through GDS NDC connectivity. All of these methods, along with the service providers' certification, require IATA membership in the IATA NDC program (Altexsoft, 2021).

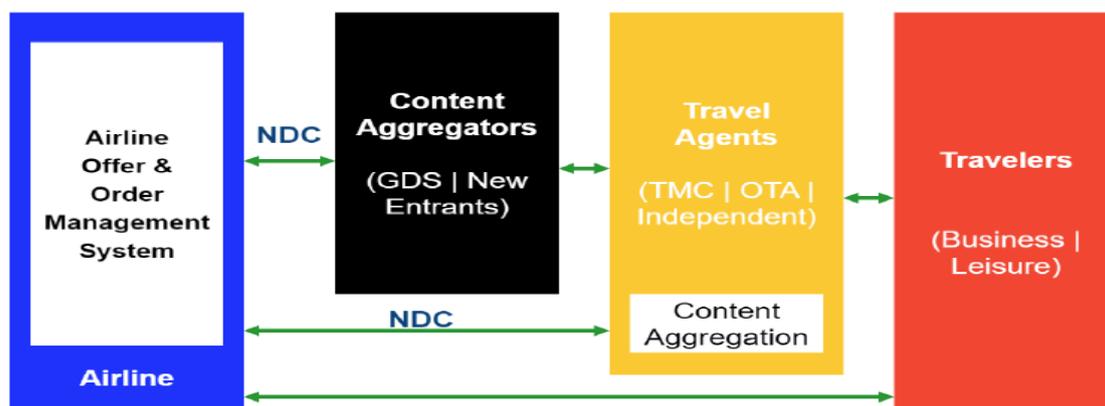


Figure (3). Indirect flight distribution after NDC  
Source: IATA (2019b)

## 5- Certifications levels of IATA NDC

Registration in the IATA program grants the company which could be an airline, seller, aggregator, and IT provide a certificate with a specific level of service (IATA, 2019c). In 2015, IATA declared different levels of certification: level 1 includes carrying out using past and current NDC schemas with a defined limited scope such as sales of post-booking and ancillaries, level 2 is differed with the extensive implementation of the shopping/offer management APIs Application Programming Interfaces, level 3 covers both of ordering and management implementation with full control of shopping for the airlines as well as booking, payment and issuing tickets. In 2018 IATA launched two new levels: NDC level 4 to cover carrying out with full offer and order management, including shopping, booking and a limited scope of post-booking processes like changes and cancellations, and NDC @ Scale to Cover evaluation on four dimensions of criteria: Technical Setup, Organization Setup, Use Cases, and Capabilities. At present, almost every airline distribution company has joined the NDC initiative in one form or another. In 2022, IATA replaced its 4-level NDC certification with the Airline Retailing Maturity ARM index, a unified program supported by three characteristics, to streamline this process (Duffel, 2023).

Verifying a company's capabilities: To ensure that it possesses a specific NDC functionality.  
Partnership deployment: To monitor distributor and airline scalability in terms of communication with partners and network reach.

Value capture compass: For helping airlines to evaluate their merchandising maturity.

The number of airlines which upgraded its level 4 certificate into ARM has reached 66 airlines (Altexsoft, 2023). Noteworthy, Air Cairo and Fly Egypt as Egyptian Low Cost Carrier LCC, airlines registered in IATA program and are certified with level 4 (NDC marketplace, 2023), while EGYPTAIR as the national Full service carrier FSC started a cooperation with TP-Connects Company – travel technology solutions - since October 2022 to introduce a new distribution channel NDC for EGYPTAIR. In March 2023 EGYPTAIR launched its NDC Platform (ers.egyptair.com) on a trial basis in cooperation with more than 50 travel agents inside Egypt (Attia, 2023). TP-Connects announced on June 19, 2023, that EGYPTAIR is the most recent full-service international airline to utilize the company's offer and order management solution, which is based on IATA's NDC and has the ARM certification (Tpconncts, 2023).

## 6- Scenarios for Implementing the NDC

Online travel agencies OTAs and other travel vendors will have three options or channels as of 2023 for gaining access to New Distribution Capability NDC content. These channels consist of direct access via an airline's NDC API, NDC aggregators, and GDS NDC connectivity.

**NDC with GDSs:** GDS aggregators recognized the critical importance of NDC implementation, prompting them to proactively advocate for the widespread adoption of an XML standard throughout the industry. Concretely, all three of the major global distribution systems GDSs are certified for the ARM index. Sabre and Amadeus are system providers for airlines as well as sellers, and Travelport is a system provider for sellers only (Tilson and Krau, 2015).

**NDC with flight aggregators:** As new players in the airline distribution landscape, flight aggregators connect directly to both full-service FSC and low-cost LCC airlines as well as to global distribution systems GDSs to access NDC, GDS, and LCC offerings. Travel vendors can use a pre-made booking tool or an applicable API to access this content. This alternative comparing to GDS NDC can present more NDC connections (usually 25–30 airlines on average), more affordable prices, faster integration process and more flexibility when it comes to commercial negotiations and the creation of specialized technology solutions. A study by Altexsoft, (2021) highlighted the most famous NDCs flight aggregators as follows: Air Gateway caters to the requirements of over 200 travel agencies globally, with a particular emphasis on corporate travel management. Duffel connects OTAs and various distributors to a network of over 300 carriers through a unified Flight API. In addition to GDSs and wholesalers, HitchHiker also oversees a Flight API that obtains data from over 120 Full-Service Carriers FSCs and Low-Cost Carriers LCCs, more than 20 of which have New Distribution Capability NDC. In addition to working with more than 400 low-cost airlines, Travelfusion has NDC relationships with at least 55 full-service airlines. Agents can book directly with 33 airlines through Verteil, including NDC and LCC flights. The function of flight aggregators as intermediaries between travel agencies, LCCs, GDSs, and FSCs (Altexsoft, 2023).

**NDC with airlines:** Airlines are actively engaged in IATA's AMX index program, which seeks to enhance the adoption of New Distribution Capability NDC across the travel industry. Nearly all major airlines currently possess direct NDC APIs, and an increasing number of mid-sized carriers are becoming participants in this initiative.

## 7- Benefits of NDC

Airlines, travel resellers, and end users are all guaranteed a number of benefits by NDC in the travel industry (Kays and Krishnan, 2021):

**Rich customer experience:** Airlines are unable to merchandise extra services through third-party vendors by using the EDIFACT protocol. Since ancillaries constitute carriers' primary source of profit, this causes financial losses. This problem is addressed by NDC, which permits carriers to use the XML protocol for merchandise rather than the EDIFACT protocol. NDC gives airlines access to extra luggage space, more legroom, onboard WIFI and entertainment, meals that are pre-ordered, upgrades and modifications on the day of departure, carbon offsets, and more (Popovich, 2016). Apart from the aforementioned, NDC enables airlines to furnish distributors with images, comprehensive product descriptions,

promotional communications, detailed seat maps accompanied by pricing details, and additional forms of flight content. Resellers, in turn, have the option of letting clients choose their own seats, pay with a variety of methods, and use miles or points from loyalty programs (Altexsoft, 2023).

**Reduced dependence on outdated or legacy systems:** The majority of airlines depend on outdated Passenger Service Systems PSSs, which is considered a software network applications, that help airlines manage all the passenger-related operations from ticketing to boarding, this system may not operate well. By using airlines' private interfaces, NDC-capable engine can present data from PSSs databases outside of legacy systems.

**Personalized offer formulation:** The airlines can tailor or personalize the traveler experience through NDC flow. However, GDSs, OTAs, TMCs, and other distributors have the authority to provide end users and travelers with those personalized offers.

**Real-time, flexible ticket prices:** Airline Tariff Publishing Company ATPCO, which has emerged as the primary source of pricing information, is currently used by the majority of airlines to publish their tariffs. It prevents prices from being promptly adjusted to reflect shifting demand because it stands between distributors and airline revenue management teams. Based on the state of the market and the characteristics of the passenger, NDC gives carriers the ability to implement dynamic pricing or customize fares in real-time (Altexsoft, 2021).

**Decrease cost for travel agents:** Each travel agent used to pay fees to GDS systems for using systems in searching flight which known as “look to book ratio”, while they don't have to pay fees by using NDC (Vellapalath, 2018).

## **8- NDC Challenges**

There are some concerns that should be taken from seller and aggregators to adopt NDC concept as mentioned below (Gallego 2021):

**Increased Complexity with Multiple Portals:** As more airlines promote NDC and offer their individual portals, agents are faced with the daunting task of navigating multiple platforms. This can lead to inefficiency and increased room for error.

**Back Office System Integration:** Historically, back-office systems were designed assuming agents would primarily use Global Distribution System GDS. Direct airline portals often don't offer a seamless way to integrate this valuable data, leaving a gaping hole in an agent's workflow.

**Manual Data Entry & Inefficiencies:** The absence of automated data integration means agents would manually enter data. This not only consumes time but also introduces the potential for human errors. Crucially, it deprives agencies of comprehensive Management Information System MIS reporting and automated reconciliation.

**Lack of Credit Control System:** While GDS platforms offer credit control systems, direct airline portals typically don't. This creates challenges in managing finances efficiently.

## **Methodology:**

This study used the analytical descriptive approach, whose instruments and procedures provided a quantitative and qualitative description of the investigation. The empirical portion of this study is based on structured interviews, that provide descriptions of attitudes and opinions of the target population through studying a sample of this population.

## **Sampling and Data Collection:**

The Egyptian Travel agent's Association (ETAA, 2023), reports that the number of travel agents category (A) is 2221 agents in Egypt, and 1242 in Cairo. Travel Agents category (A) were chosen as the sample frame because they have license to operate in all tourism and travel activities. Cairo was chosen because it has more than half of the total number of travel agencies in Egypt. The study is conducted on a purposive non-probability sample that is selected based on characteristics of a population and the problem and the objectives of the study. The study depends on a purposive sample of 30 travel agents in Cairo, which were the only travel agents that mainly depend on the selling of airline tickets, and depend on both of NDC platform and one of GDS systems. The number 30 often is used as a rule of thumb for a minimum sample size in statistics because it is the point at which the central limit theorem begins to apply, accordingly 30 is considered a good starting point for sample size (Speigelhalter, 2020). The Researchers chose the practitioner segment to be questionnaire's respondents and focused on air ticketing agents because they are aware and updated with every change in selling airlines' systems. The research based on the use of structured interviews, which is considered a data collection method that relies on using predetermined questionnaire (George and Merkus, 2023). Structured interviews were conducted during the period from November 2022 to March 2023.

## **Research Measures**

This research is constructed to investigate the NDC usage acceptance in Egyptian travel agents comparing to GDS usage, by appointing Technology Acceptance Model TAM Theory as a base. TAM Theory is considered the mostly applied model to measure the experience of technology adoption in tourism. TAM is concerned with two aspects of technology use: Perceived Ease Of Use PEU, which is the user's perception that using a system requires no physical or mental effort, and Perceived Usefulness PU, which is the degree to which a person believes that using a particular system would enhance his job performance (Venkatesh et al., 2003; Mallat et al., 2006 ; Al Azab & Fahmy, 2016 ; Al Jahwari et al., 2022).

Researchers retrieved TAM variables in the questionnaire from the study of Al Jahwari et al. (2022). In this research TAM aspects are integrated with other constructs which is retrieved from the factors that affecting the GDS usage such as: Awareness of the service AW that directly affects users' intentions to utilize the technology, Perceived Risks and Challenges PC are a person's subjective beliefs about the potential drawbacks of utilizing particular technological systems and Communication Channels. CC. In this study's questionnaire, The earlier variables were taken from the study of Budiasa et al., (2017). A 5-point Likert-type scale, ranging from (1) strongly disagree to (5) strongly agree, was used to evaluate each multiple-item measure.

## Data analysis

In this study, Data were analyzed by employing SPSS version 20-software package. Suitable statistical measures were used to examine the variables and find results. The Important Performance Analysis IPA was then employed to investigate the difference between the importance of the factors that influencing the NDC usage as perceived by travel agents, and their perceptions of NDC performance in relation to these factors. In recent years, IPA model has gain popularity as a managerial tool for determining the strengths and weaknesses of a brand, services, products or retail establishments in various industries in recent years (Maher and Mahrous,2014). Diagrammatically, the IPA analysis is presented on a grid with four quadrants. The Y-axis displays the items and feature performance in relation to these attributes, while the X-axis indicates the practitioner's perceived importance of the designated variables or attributes. It might require judgment to place the horizontal and vertical axes on the grid in the right places. The variables were divided into four distinct quadrants by means of the intersection of horizontal and vertical lines with the mean values of the importance and performance parts. As a result, the data was displayed as a grid with each variable ranked in order of perceived performance and importance (Abdel Warith,2021). The model displayed the attributes (importance) vertically from up to down and attributes (performance) on the horizontal axis from left to right as shown in (Figure 4). IPA model recommends for management, responsables, or developers the required action that should be taken for each quadrant. Each attribute lies in quadrant (1) need to be focused, while each attribute lies in quadrant (2) indicates to keep up the good work, although each attribute lies in quadrant (3) has a low priority to be enhanced, and the last quadrant indicates that each attribute lies here has a performance more than desired or expected.



**Figure (4). IPA Model**  
Source Maher and Mahrous (2014)

## Results and discussion:

### Compared Means

As shown in table (1), compared means was deducted to investigate the NDC usage acceptance in Egyptian travel agents comparing to GDS usage.

**Table (1) Compared Means of NDC's factors**

Attributes	N	Minimum	Maximum	Mean	Std. Deviation	Level of agree
Awareness of Benefits AW	30	1.00	2.75	2.0000	.68229	Not sure
Perceived Ease of Use PEU	30	1.25	3.00	2.4333	.46393	Agree
Perceived Usefulness PU	30	1.00	3.00	2.2667	.55640	Not sure
Perceived Challenges and Risks PC	30	1.00	3.00	1.9333	.69149	Not sure
Communication Channels CC	30	1.00	3.00	1.9333	.75124	Not sure
Valid N (listwise)	30					

Table (1) shows the practitioners' opinion of Egyptian travel agents' acceptance about the factors that influences NDC performance. The mean rank of factors ranged from (1.39) to (2.43), and all factors refer to agreement level (not sure) except the factor (perceived of ease of use) has (M= 2.43) which mean that the Egyptian travel agents have the ability to train their staff on search, sell, issue and reissue tickets easily compared with GDS's systems but they are not sure about the ability of the other factors. The other factors have (M= 2.26) for (perceived usefulness) which refers to the ability of selling extra services, gain more profits, and customize personal offers are not available for all airlines on NDC, because of that they cannot stop using GDS and depending completely on NDCs' platforms. The factor of awareness of benefits has (M= 2.00), which means that Egyptian travel agencies are not sure about how widespread the NDC is and also about the ability of NDC to accommodate the most of airlines compared with GDS.

The factor perceived challenges has (M= 1.93) which refers to that attributes are not sure about the ability of NDC to allow accessing to all airlines' offers, and also see that NDC in its early stage and doesn't reach yet the level of perfection.

The last factor is communication channels which has (M= 1.93) and also lies in agreement level (not sure) which indicates that travel agents' practitioners have some problems in communication with services providers and also, they are not satisfied enough about after sales services.

The values of standard deviation in table (1) indicate that data are clustered tightly around the mean. According to this analysis, Egyptian travel agents agreed with that NDC is ease of use and do not have technical obstacles of training their staff on its implementations, however they still uncertain about the ability of NDC in all other factors compared with GDS system and they are not ready yet for the complete transmission from GDS into NDC.

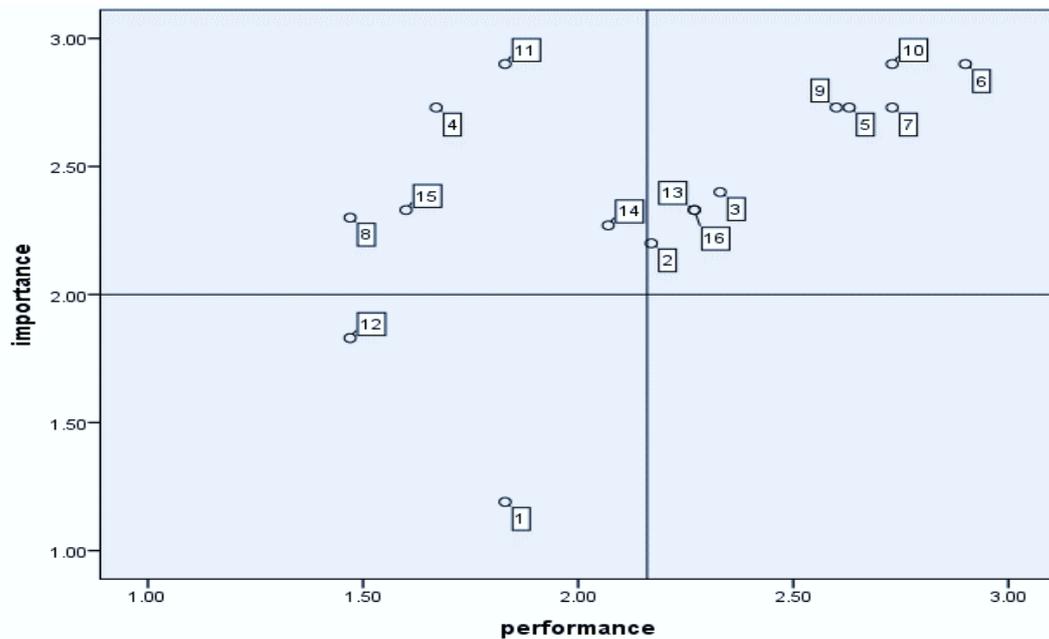
### IPA Model:

Table (2) show mean scores of each attribute about its performance and also about each importance regarding respondents' opinion. The table indicates that, the mean importance rating for the five factors was ranging from 1.19 to 2.9 and the mean Performance rating was ranging from 1.47 to 2.9.

**Table (2) Mean Rating of Importance and Performance of NDC characteristics**

attributes			IPA quadrant	Mean Performance	Mean importance
<b>Perceived of awareness (PW)</b>					
1	AW1	depending of NDC rather than GDS	Quad 3	1.83	1.19
2	AW2	Spreading quickly	Quad 2	2.17	2.20
3	AW3	Airlines' transmission into NDC	Quad 2	2.33	2.40
4	AW4	GDSs' transmission into NDC	Quad 1	1.67	2.73
<b>Perceived of ease of use PEU</b>					
5	PEU1	selling and issuing tickets	Quad 2	2.63	2.73
6	PEU2	Training	Quad 2	2.90	2.90
7	PEU3	displaying of services' information	Quad 2	2.73	2.73
8	PEU4	reissuing and refund tickets	Quad 1	1.47	2.30
<b>Perceived of usefulness</b>					
9	PU1	Selling of additional services	Quad 2	2.60	2.73
10	PU2	Profitability	Quad 2	2.73	2.90
11	PU3	Offers customization	Quad 1	1.83	2.90
<b>Perceived of challenges</b>					
12	PC1	Airlines Accessibility	Quad 3	1.47	1.83
13	PC2	Adaptation to new airlines' offers and orders	Quad 2	2.27	2.33
14	PC3	Perfection of NDC early stages	Quad 1	2.07	2.27
<b>communication channels</b>					
15	CC1	service providers' communication	Quad 1	1.60	2.33
16	CC2	After sale service	Quad 2	2.27	2.33

Importance Performance Analysis Model IPA was deducted to explore the attributes of each factor that have the high priority to be considered (concentrate her), attributes indicate to (keep up good work), attributes that have (low priority), and the attributes that do not need more effort for enhancement (possible overkill). The model is counting on categorize attributes according to their importance and performance level as shown in figure (5).



**Figure (5). Attributes distributions**

The following analysis provides some meaningful insights about the quadrant's presentation:

**Quadrant 1** Concentrate here quadrant – (High Importance - Low performance):

This quadrant presents the factors which are perceived to be very important to respondents, but performance levels are fairly low. This sends a direct message that improvement efforts should concentrate here. Figure (5) shows that attributes 4, 8, 11, 14 and 15 which form 25% of AW, PEU and PU factors, and form 1/3 of the factors PC and CC have a high importance for travel agents but their performance is low, so the developers of NDC implementations must concentrate on these attributes and give them the first priority to be concerned by informing travel agencies about NDC capabilities, enhancing NDC's functions of reissuing and refund tickets, encouraging travel agents to depend on NDC platforms to customize offers to their travelers, raising the perfection of NDC platforms, and enhancing the ways of communication channels with travel agencies. That's because of one of main advantages of applying NDC in travel agents, as mentioned in the literature study is the Rich shopper experience and Personalized offer creation (Altexsoft, 2023).

**Quadrant 2** Keep up the good work quadrant – (High importance - High Performance):

In this quadrant, factors are perceived to be very important to respondents, and at the same time, it have high level of performance. The message here is to keep up the good work. The attributes 2, 3, 5, 6, 7, 10, 13, 16 were identified in this quadrant as illustrated in figure (5). This refers to that the travel agents are satisfied with the rate of spread of the NDC's concept, the average of airlines transmitted into NDC, the ease of use for selling, training and displaying information, the level of profit achievement for travel agent, the ability to sell new offer from airlines, and the level of after sale service. That is clearly occur with what was mentioned in the literature study that Air Cairo and Fly Egypt as Egyptian LCC (Low cost carrier) airline

registered in IATA program and are certified with level 4(NDC marketplace, 2023), and also EGYPTAIR as the national FSC (Full service carrier) started an cooperation with TP-Connects Company – travel technology solutions - since October 2022 to introduce a new distribution channel NDC for EGYPTAIR. In March 2023 EGYPTAIR launched its NDC Platform ers.egyptair.com on a trial basis in cooperation with more than 50 travel agents inside Egypt (Attia, 2023), and in June 19<sup>th</sup> 2023 TP-Connects announced that EGYPTAIR has become the latest full service international airline to adopt TP-Connects’ offer and order management solution based on IATA’s NDC with the ARM certification (Tpconnects, 2023).

### **Quadrant 3** Low priority quadrant: (Low importance - Low performance)

This quadrant presents those factors with low importance and low performance. Respondents perceive those factors as less important when compared with other factors. Figure (5) shows that low priority quadrant identifies all remain attributes 1 and 12 where are performing adequately, but practitioners perceive them as less important when compared with other attributes. Although the result’s show that respondents didn’t perceive these factors important, this doesn’t mean that efforts should be reduced to improve it. Travel agents still uncertain about the ability of NDC compared with GDS system and they are not ready yet for the complete transmission from GDS into NDC, This result occurs with the main challenges that face travel agents while depending on NDC.

### **Quadrant 4** Possible overkill quadrant: (Low importance - High performance):

This quadrant involves the factors of low importance, but relatively high performance. The analysis did not identify any attribute by practitioners as being low importance with relatively high performance.

## **Conclusion**

This study has demonstrated that in the evolving world of aviation, the New Distribution Capability NDC has emerged as a modern standard for the airline distribution industry, spearheaded by IATA and embraced by numerous airlines. It promises greater flexibility, richer content, and more customized offers for travelers. But like any major shift, its adoption brings some challenges, especially for travel agents. According to IPA in this research, Egyptian travel agents agreed with that NDC is ease of use and do not have technical obstacles of training their staff on its implementations, however they still uncertain about the ability of NDC in all other factors compared with GDS system and they are not ready yet for the complete transmission from GDS into NDC. From the empirical study, researchers found that, however NDC introduce variety of rates for each airline, the travel agent must move between airlines’ NDCs separately most of the time to compare between offers specially if it doesn’t use a flight aggregators NDC. Empirical study also indicates that, NDC introduce good opportunity to TMC to gain more profits through selling airlines ancillaries, adding mark up on air ticket’s rate, and also avoiding travel agents “look to book ratio” fees that used to be paid from travel agents to GDS for searching flight tell making booking. NDC addresses this issue as it allows carriers to merchandise depending on XML instead of EDIFACT. NDC allows carriers to excess baggage, extra legroom, onboard WiFi and entertainment, pre-ordered meals, day of departure changes and upgrades, carbon offsets, and more. NDC enables Travel Management Company TMC to customize various offers with

categorized rates to be available to their customers. TMC has the opportunity to be flight aggregators through NDC by designing its platform and getting NDC IATA license to be able to distribute airlines services. As a conclusion, NDC still in the primary stage and doesn't cover all airlines, because of that travel agencies cannot stop selling via GDS in this stage. Egyptian travel agencies still not sure enough about how Egyptian flight aggregators can be able to introduce accurate flight information as same as GDS.

As a matter of fact, researchers encounter certain challenges while conducting this study. The main challenge was that most travel agents were unconsciousness about the NDC concept, they supposed that NDC follows one of the GDS platform. This challenge led to a restriction in the sample size. Overall, this study has yielded some insightful findings. however, further investigation is required in the future to gain a deeper comprehension of applying NDC technology platform in the Egyptian travel agents. Besides, to more broadly interpret the study's findings, a larger sample size is recommended when the number of travel agents using NDC rises. Furthermore, the researchers suggest future researches about the ability of GDS to expand its platforms in order to conform with the NDC and maintain its market share in travel market.

## **Recommendations**

1. Because of NDC still in its primary stage and many airlines still depend on GDS, the TMC must keep selling via GDS in parallel with NDC to assure the high coverage to the market.
2. There must be wide campaign by NDC developers and airlines to aware travel agents with NDC usage's benefits.
3. TMC must make their clients aware with the new offers and price categories that offered from airlines via NDC to encourage them to customize their flights.
4. TMC have to change its way of selling tickets and use to benefit from categorized offers and selling the airlines ancillaries.
5. To avoid searching for the best offer on each airline's NDC separately, travel agents need to depend on NDC flight aggregators to save time and compare airlines' offers easily.
6. The developers of Egyptian NDC must solve the problems that facing Egyptian travel agents about reissuing and after selling services.
7. Egyptian NDC flight aggregators must contract with all airlines that work in Egyptian market to deliver the same services that GDS introduces to travel agents, especially after all three major GDS had ARM certificate and be able to introduce offers using XML.

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## قدرات التوزيع الجديدة في شركات السياحة المصرية: قياس قبول التكنولوجيا وتحليل العوامل المؤثرة في استخدامها

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### ملخص البحث

يمكن وصف قدرات التوزيع الجديدة (NDC) بأنه المفهوم الجديد الذي طرأ حديثاً على أنظمة بيع تذاكر وخدمات شركات الطيران. فهو عبارة عن منصة تكنولوجية تم تطويرها من قبل شركات الطيران ومدعومة من قبل الاتحاد الدولي للنقل الجوي (IATA) وفق ما تم الاعلان عنه في سبتمبر ٢٠١٥. يهدف هذا المفهوم الجديد إلى تحرير خدمات شركات الطيران من صورة القوالب الجامدة والمتمثلة في بيع تذاكر طيران شاملة خدمات محددة باختلاف مستويات الأسعار إلى تمكين وكالات السفر من الوصول مباشرة إلى محتوى خدمات شركات الطيران ومن ثم امكانية تشكيل خدمات مختلفة لكل راكب وبمستويات أسعار متنوعة. وبناء عليه يهدف هذا البحث إلى قياس مدى تقبل وكالات السفر المصرية إلى هذا المفهوم الجديد واكتشاف مدى قدرته على الوفاء باحتياجات وكالات السفر مقارنة بقدرات أنظمة التوزيع العالمي (GDS) المستخدمة من قبلهم. وقد اعتمد الباحثين على تحديد معايير القياس استناداً إلى نموذج يعرف باسم (TAM) والتي تشمل عناصره على معايير تقبل التكنولوجيا الجديدة. كما اعتمد الباحثين في الدراسة الميدانية على نموذج الأهمية والأداء (IPA) لاستطلاع رأي وكالات السفر عن مدى كفاءة (NDC) مقارنة بأنظمة (GDS) حيث تم التوصل إلى عدة نتائج من أبرزها أن التكنولوجيا الجديدة سهلة الاستخدام والتدريب عليها، كما تتيح لوكالات السفر فرصة تحقيق مكاسب أكبر من خلال بيع خدمات متنوعة لشركات الطيران، إلا أن أهم العوائق التي تحول بينهم وبين تحولهم الكامل في الاعتماد على تكنولوجيا (NDC) هو عدم اليقين من مدى دقة واشتمال التكنولوجية الجديدة على معلومات السفر مقارنة بأنظمة (GDS) خاصة وأنها لا تزال في مراحل عملها الأولية.

الكلمات الدالة:

نظم الحجز المركزية - نظم التوزيع العالمية - قدرات التوزيع الجديد - نموذج قبول التكنولوجيا - نموذج الأهمية والأداء