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THE IMPACT OF AIRCRAFT CABIN DIGITALIZATION ON IMPROVING PASSENGER EXPERIENCE IN EGYPTAIR

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Abstract: This study aims to investigate the impact of aircraft cabin digitalization (smart electronically dimmable windows, intelligent seats, smart overhead bins, radio-frequency identification tags for luggage tracking, futuristic intelligent seats, and inflight virtual reality) on improving the inflight passenger experience in EgyptAir, as well as measuring passengers' interest in using digital cabins. Furthermore, exploring passengers' intention to pay to use digital services, including futuristic intelligent seats, inflight virtual reality, and radio frequency identification tags for tracking luggage. To meet the research goals, a structured survey was designed and distributed among Egyptian frequent travelers in EgyptAir. A total of 311 complete surveys were collected and analyzed. Results indicated the high interest of Egyptian passengers in using the digital aircraft cabins in EgyptAir due to its significant impact on improving their inflight experience. Furthermore, analyses revealed the high intention of Egyptian passengers to pay to use inflight virtual reality and futuristic intelligent seats. However, they showed a moderate intention to pay to use radio frequency identification tags for tracking luggage.

Key words: digital cabins, passenger experience, inflight, frequent travelers, EgyptAir

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INTRODUCTION

With the rapidly increasing competition in air transportation, it becomes essential for airlines to adopt various digital trends in the aircraft cabin to provide passengers with a more entertaining experience during flight (Gaspar, 2015). Commercial airlines can address the industry's challenging competition intensity by employing digitalization. As digitalization provides commercial airlines with insight into their competitive environment as well as the needs of their customers (IATA,2020). Digitalization, according to Kraus et al. (2021), is the readjustment or new investments in technology and business models to more efficiently engage digital consumers at every contact point in the customer experience lifecycle. Moreover, Parviainen et al. (2017) stated that "digitalization" refers to the changes associated with the application of digital technology in all aspects of human society. It is also able to turn existing products or services into digital variants, thus offering advantages over tangible products. Digitalization is changing the expectations of passengers around the world. The rapid development of technology has led to a significant change in the behavior of humans, organizations, and the structure of the market. The effective use of mobile devices and the Internet of Things (IoT) brings a good opportunity to enhance an airline's performance and facilitate customer interactions in terms of buying and consuming products or services (Osmundsen et al., 2018). Passengers' travel experiences can be enhanced by introducing new digital services. The use of digital services in airlines is an important factor that contributes significantly to improving passenger evaluations of the airline and maintaining loyalty (Heiets et al., 2022). Al-Gharaibeh and Ariffin (2021) highlighted that the higher the passenger's satisfaction with the airline's services, the more intention they have to fly again with this airline.

In line with this, Parviainen et al. (2017) emphasized that ignoring digitalization could negatively impact the airline by causing it to lose its competitive advantage in highly competitive markets. With the emergence of digitalization, a large number of passengers seek more control over their flights through automated and personalized options (Halpern et al., 2021). Therefore, allowing passengers to control their personal and immediate space during flight is an essential aspect of the aircraft cabin to provide the passenger with an entertaining experience. Design improvements such as personal light controls, temperature controls, and seat controls need to be integrated into the aircraft cabin interior to improve the inflight passenger experience (Bouwens, 2018a). Despite the potential benefits connected aircraft cabins

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can bring to both airlines and passengers, limited research has been conducted to study digitalization in the aircraft cabin in the context of EgyptAir. Moreover, there is a lack of analysis of the passenger interest and acceptance of digitalization in the aircraft cabin in EgyptAir. Egypt Air’s competitors are increasingly embracing digital services in aircraft cabins to improve passenger experiences. Thus, investigating how digitalization can be used to improve EgyptAir's aircraft cabin service is critical to gaining a competitive advantage and improving the passenger experience.

According to IATA (2020), it is now more important for airlines to employ digitalization to gain a sustainable competitive advantage in highly competitive markets. Moreover, Heiets et al. (2022) highlighted that airlines should conduct studies to identify what types of digital technology will be accepted and preferred by passengers. Therefore, the current study contributes to measuring passenger interest and acceptance of using digital aircraft cabins in EgyptAir, as well as investigating to which extent digital aircraft cabins will contribute to improving passengers' in-flight experience. Previous studies that investigated the impact of innovative technology on the passenger experience were limited to a specific technology trend. La et al. (2021) conducted a study to investigate how passengers value inflight entertainment systems when they travel and their impact on improving their inflight experience. In addition, Williamson et al. (2019) explored passengers' attitudes toward the social acceptability of VR during air travel. Moreover, Bouwens et al. (2018b) investigated the effect of in-seat exercise on the comfort perception of airplane passengers. However, our research examines the impact of various innovative technologies (smart electronically dimmable windows, intelligent seats, smart overhead bins, radio-frequency identification tags for tracking luggage, Zero-Touch inflight entertainment screens with 4K clarity, and inflight virtual reality) on improving the passenger experience Decision-makers in EgyptAir may be reluctant to take broader steps towards investing in digitalization for fear of not achieving profits in turn. Therefore, this study investigated passengers' willingness to pay extra prices to experience (futuristic intelligent seats, inflight virtual reality, and radio frequency identification tags for tracking luggage). The study applied to frequent Egyptian travelers in EgyptAir.

LITERATURE REVIEW

1. Passengers' perception of digitalization in the airline industry

The emergence of digitalization has resulted in a significant change in consumer behavior (Berschik et al., 2022). Therefore, identifying passengers’ needs and preferences has become essential to meet their expectations and enhancing their satisfaction in the future (Hassan and Salem, 2021). A study has been conducted by Shiwakoti et al. (2022) to evaluate Chinese passengers' attitudes and satisfaction with digital services provided by airlines. The results reveal that the majority of Chinese passengers showed a high interest in using airline technology, including artificial intelligence and the Internet of Things. due to their roles in enhancing passengers' confidence in airlines and service quality while traveling.

Moreover, the previous study by Heiets et al. (2022) to measure passengers' attitudes toward digitalization in the airline industry found that the majority of passengers perceived digital technology as an important factor in enhancing their experience. They showed a high interest in using digital services such as online and self-service check-in for their luggage, due to their time saving and convenience. The results of the study also revealed that the majority of passengers, especially frequent fliers, prefer to access their flight information via their mobile phones and flight information display systems. Another study was conducted by Halpern et al. (2021) to identify passenger preferences for using digital technologies at airports in Norway. The findings of the study showed that passengers have a high-interest level in using digital technologies at Norway airports including an infrared camera and facial recognition because they improve the speed of identity verification for passengers, allowing for faster and more convenient boarding passengers also show a high interest in using mobile payment applications because it's a more secure method of payment than using a credit card.

2. Aircraft cabin digitalization

The cabin interior is the most important factor in the passenger's choice of an airline. There is a strong correlation between aircraft interior comfort and the passenger's intention to fly again with the same airline (Kökény et al., 2022). In the digital cabin, everything on board, from engine performance to the inflight entertainment system, is connected and monitored in real time. The connected cabin is an integrated system developed by Airbus made up of sensors and displays that track passengers' flight experiences. It provides real-time links between passengers and cabin crew with core cabin components such as the galley, lavatory, meal trolleys, seats, and overhead bins to provide passengers with a more personalized environment and improve passenger interaction with cabin components (Airbus, 2022). By employing digital cabins, passengers can control their environments, such as lighting, window shades, seat movement, and climate, directly from their smartphones and personal devices (Ninnemann et al., 2022) Therefore, it is proposed that:

H1: passengers' interest in using the digital aircraft cabin has a significant impact on improving their inflight experience.

2.1. Smart Electronically Dimmable Windows (SEDWs)

Aircraft windows are a primary path for heat, noise, glare, and other environmental elements. These unwanted elements cause passengers discomfort. Additionally, aircraft windows sometimes block the view, preventing passengers from enjoying the scenic beauty. As a result, Boeing began to use smart electronically dimmable windows, which allow passengers to control the amount of light coming into the aircraft cabin at the touch of a button to preserve views and reduce unwanted glare while preserving the view (Zakirullin, 2022). By employing SEDWS, passengers don't have to manually push the window shade up or down aboard the new A350; instead, they can adjust their window shade setting with the touch of a button (Boeing, 2021). Thus, it is proposed that:

H1a: Passengers' interest in using smart electronically dimmable windows has a significant impact on improving their inflight experiences

2.2. Futuristic intelligent seats

It allows passengers to monitor and control their seat conditions by using their phones to improve the in-flight passenger experience on short- to mid-haul flights. The intelligent seat cover is connected to a series of sensors that detect both the passengers' bodies and the conditions of their seats, including temperature, seat tension, pressure, and movement, all of which can be monitored and controlled by passengers via the Layer's Move app on their phones. In addition, the seat automatically adjusts itself during flight based on the passenger's weight, size, and movement by passing a current through the conductive yarn to change the seat tension. It also addresses the issue of "legroom rage" in economy class seats caused by passengers unnecessarily reclining on a shorter flight by adjusting the seat back position (Layer Design, 2021). Therefore, it is suggested that:

H1b: Passengers' interest in using futuristic intelligent seats has a significant impact on improving their inflight experience.

2.3. Smart overhead bins

The most common reason for passenger boarding delays is the storage of carry-on luggage in overhead bins. The time it takes to find a suitable space will increase boarding time. Passengers with many pieces of luggage require significantly more time to store everything. In some cases, they may have to move to other rows to find available space (Nugroho and Asrol,2022). Moreover, Garg (2017) stated that time spent by passengers looking for available overhead bin storage space for carry-on baggage during the boarding process leads to inconvenience for passengers and can result in delayed departure. Cao et al. (2023) clarified that delays have a significant impact on passenger satisfaction. Moreover, Luo et al. (2021) highlighted that the boarding time is crucial since it impacts the efficiency of the aircraft as well as passenger satisfaction. Therefore, airlines and aircraft manufacturers have tried a variety of approaches to address boarding delays. Airlines, for example, have altered the size and shape of overhead bin storage space to make it more usable, but due to space constraints, this option has been found ineffective in reducing boarding time. As a result, there is a need for an improved system that aids in speeding up the aircraft boarding process (Garg, 2017). Airbus introduced system aids in boarding by providing a clear visual indication of whether space is available in each overhead luggage storage bin. Even if the overhead luggage storage bin is closed, such an indication is visible from a distance. Airbus installed a green, yellow, and red light system that informs passengers of the amount of space remaining in each bin. A red light indicates that the storage is full, a green light indicates that there is enough space for luggage, and a yellow light indicates that there is only space in the bin for small items such as coats. Passengers using this system can quickly move down an aircraft aisle to an available bin without having to open each closed bin to check for available space (Tiu et al., 2016). Thus, the following hypothesis arises:

H1c: Passengers' interest in using Smart overhead bins has a significant impact on improving their inflight experience

2.4. Inflight entertainment systems

2.4.1. Zero-Touch inflight entertainment screens with 4k clarity

By implementing Zero-Touch technology, passengers can pair their electronic devices with their seat-back inflight entertainment screen by connecting to Wi-Fi and scanning a QR code displayed on the screen. They can then use their electronic devices to navigate and enjoy the airline's inflight entertainment system options. For example, Qatar Airways introduced the 100% Zero-Touch technology Oryx One in-flight entertainment system across its B777, A350, B787-8, A320, and A321 fleets. Qatar Airways is the first airline in Europe, the Middle East, and North Africa to apply this technology in business and economy class. This has come as part of the airline's latest COVID-19 safety measures to limit the spread of infection on board (Qatar Airways, 2021). So the following hypothesis is proposed:

H1d: Passengers' interest in using zero-touch inflight entertainment screens with 4k clarity has a significant impact on improving their inflight experience.

2.4.2. In-flight virtual reality (VR)

Laukkanen et al. (2022) defined VR as a method of immersing people or any object in a world that can be manipulated without the risk or fear of reality. The applications of virtual reality in the aviation industry are numerous and diverse and are now being used to improve commercial aircraft, aviation training, component design, and many other uses (Moerland-Masic et al., 2022). VR is a great opportunity for airlines to improve passenger experiences and overcome a fear of flying. There are many existing trials by airlines to apply inflight VR inside the cabin to improve the passenger experience (Iberia, 2022). For example, SunExpress, a Turkish-German airline, provided 15 in-flight VR devices on all flights departing from Antalya, Turkey, to vacation destinations across Europe. Passengers showed high satisfaction with VR. They perceived it as very entertaining (SunExpress, 2019). Furthermore, Alaska Airlines tested VR for first-class passengers with short films aimed to make customers feel like they are in a private movie theatre rather than a closed cabin (Alaska Airlines, 2018). Moreover, Iberia, the Spanish flag carrier, was seeking advanced products and services to improve the passenger experience and distinguish itself in a highly competitive market. Therefore, it decided to apply an inflight VR solution to its flights in business and economy class for a six-month trial period on routes between Madrid, New York, Miami, and Tel Aviv (Iberia and Inflight VR, 2021). Initial feedback revealed a high level of customer satisfaction and a similarly high level of usability for travelers. The number of times passengers used the device was likewise consistently high. So, Iberia and Inflight VR pushed to the next level, which included equipping the full business class with virtual reality (Miller, 2019). Therefore, it is proposed that:

H1e: passengers' interest in using virtual reality has a significant impact on improving their inflight experience

2.5. Radiofrequency identification tag (RFID) for tracking luggage

Mishandled baggage is a common factor that leads to a terrible passenger experience (IATA, 2019). To address this issue, IATA (2018) described radio frequency identification tags (RFID) as an emerging technology that could benefit the airline industry by reducing the number of lost luggage. It will have a positive impact in terms of better customer service, reduced costs, enhancement of the current system, and reduced labor and human error. The consequences of airline baggage-handling issues could negatively impact carriers' ability to compete. However, being the first to market with an RFID tagging system gives the airline a competitive advantage in terms of service and cost savings (Ushakov et al., 2022). Electronic baggage tags are a form of RFID that can receive and transmit data, typically via Bluetooth, allowing travelers to track their luggage via a mobile phone app (Manabe et al., 2022). Delta Air Lines is the first airline to show that RFID could be a low-cost solution to the problem of lost luggage. Passengers who fly with Delta Airlines and use the Delta Mob app will receive notifications when the bags are loaded onto the aircraft. If a passenger's luggage is accidentally placed on the wrong flight, Delta can quickly locate it anywhere in its system by using belt loaders that will give baggage the green light when the bag is being loaded on the correct aircraft or red when the bag requires additional handling (Wan et al., 2022). Therefore, the following hypothesis is proposed:

H1f Passengers' interest in using the radiofrequency identification tag for tracking luggage has a significant impact on improving their inflight experience.

MATERIALS AND METHODS

1. Study procedures and study sample

Digitalization is changing the expectations of passengers around the world. Therefore, airlines must ensure that their products and services are tailored and delivered to passengers according to their preferences to improve their travel experience (Sahu et al., 2018). This study aims to evaluate passengers' interest in using digital services in EgyptAir's aircraft cabin and investigates the impact of adopting digital cabins on improving their in-flight experience. The flowchart of our research steps is shown in Figure 1. The target population of our study is Egyptian frequent travelers in EgyptAir.

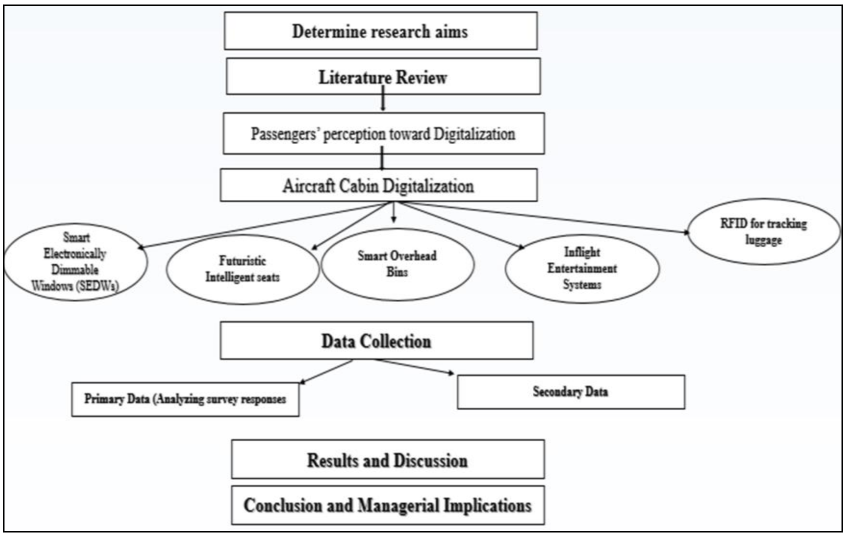

Figure 1. Research flow chart (Source: developed by authors)

The reason for selecting this sample is that they have experienced various digital trends every time they travel (Suwannakul, 2020). Therefore, we could obtain credible evaluations, accurate and realistic results for the study.The study employs a "selected sample" technique. An online survey was developed on Google Forms, and a relevant link was distributed to frequent travelers on social media platforms. The participants were informed about the survey outline, the study aims, and the research scope. The survey was originally written in English and then translated into Arabic to allow Egyptian travelers to answer in their native language; however, the survey was distributed in both English and Arabic versions. A total of 311 complete surveys were collected during the period between March and May 2022.

2. The study instrument

The survey scale used in the study is selected from previously published articles (Shiwakoti et al., 2022; Heiets et al., 2022; Ninnemann et al., 2022; Efthymiou et al., 2021; Ahmadpour et al., 2016). The survey is divided into four main parts. The first part was concerned with the demographic characteristics of the respondents (3 items), including the participants' age, gender, and type of class. The second part was concerned with evaluating passengers' interest in using the digital aircraft cabin. Respondents are asked to rate their level of interest in using five digital services in the aircraft cabin, including smart electronically dimmable windows (3 items), futuristic intelligent seats (3 items), smart overhead bins (3 items), radio frequency identification tags for tracking luggage (3 items), and inflight entertainment system (5 items).

Displayed images with a brief description of each digital service are attached to the survey. The third part of the survey included two questions aimed at evaluating passengers' overall perceptions toward digitalizing aircraft cabins and their impact on improving their inflight experience. Finally, the fourth part of the survey is concerned with estimating passengers' willingness to pay extra prices to experience inflight virtual reality, futuristic intelligent seats, and radio frequency identification tags for tracking luggage. The survey is designed based on closed-ended questions, and 5-point Likert-type scales are used for responses (1 = disagree to 5 = completely agree).

3. Statistical analysis

Various statistical tools were used to analyze the data collected from respondents. First, the study employs descriptive statistical analysis to cover a holistic overview of the sample and variables. Second, convergent validity and reliability test was conducted to measure the consistency and reliability of all items mentioned in the survey. Third, a simple linear regression analysis was conducted to test the hypotheses. The data were analyzed by using SPSS version 26.

RESULTS AND DISCUSSION

Demographic analysis

The survey showed that a majority of the respondents to this study are aged between 18-30 years old (55%) and that most of them are males (53.1%). In terms of the type of class, most of the respondents traveled in economy class (71.7%), 25% traveled in both business and economy class, and (2.9%) traveled in business class (Figure 2).

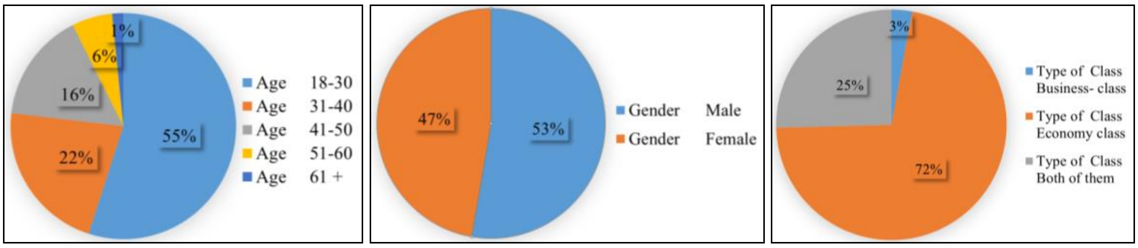

Figure 2. Sociodemographic characteristics of the sample

Convergent validity and reliability test

According to Shrestha (2021), convergent validity is used to measure the level of correlation between multiple indicators of the same construct that are in agreement. Convergent validity is confirmed when the average variance extracted (AVE) and Cronbach's alpha is greater than 0.5 and the values of composite reliability (CR) is higher than 0.7.

As a result, for the convergent validity of the survey items (table1), the average variance extracted > 0.5, the composite reliability, and Cronbach's alpha > 0.7 for all Items; Thus, it can be inferred that the convergent validity is accepted and all survey items have higher reliability.

Table 1. Analysis of convergent validity and composite reliability for passengers' interest in using digital aircraft cabins Cα: Cronbach's Alpha; CR: Composite reliability; AVE: Average variance extracted

Constructs and Items	AVE >0.5	CR >0.7	Cα
Smart Dimmable window	0.54	0.83	.914
I'm interested in using smart dimmable windows during flights.			
Smart electronically dimmable windows will have a great influence on improving my inflight experience.			
Controlling the intensity and color of light coming into the aircraft cabin by using the smart electronic dimmable windows touch button will improve my travel experience.			
Intelligent seats	0.543	0.80	.842
I'm interested in using futuristic intelligent seats with sensors.			
The Futuristic intelligent seats with sensors will improve my inflight experience.			
I have the willingness to pay higher prices to use the futuristic intelligent seats.			
Smart overhead bins	0.51	0.834	.992
Smart overhead bins will make it faster for me to find available luggage space.			
Smart overhead bins will reduce congestion in the aisle and boarding time.			
I'm interested in using smart overhead bins.			
RFID for tracking luggage	0.5	0.814	.794
Using RFID for luggage handling will increase my confidence in the airline.			
I'm interested to use a radio frequency identification tag for tracking my luggage.			
I have the willingness to pay extra costs to use a radiofrequency identification tag.			
Inflight entertainment system	0.514	0.877	.912
I am interested in using Zero-Touch inflight entertainment with 4k Clarity.			
I am interested in using inflight Virtual Reality(VR).			
I'm strongly attracted to airlines that use Virtual reality (VR) on flights.			
Virtual Reality (VR) will distract me from a discomfort situation.			
I am interested in using Zero-Touch inflight entertainment screen with 4k Clarity.			

Passenger interest in using digital aircraft cabins

Descriptive statistics were used to measure passengers' interest levels in using digital aircraft cabins. Figure 3 shows the mean of each construct related to the study**.** Respondents' rate regarding their interest in using smart electronically dimmable windows (4.19), futuristic intelligent seats (4.23), smart overhead bins (4.13), radio frequency identification tags for tracking luggage (4.21), inflight entertainment systems with 4K clarity and zero-touch screens (4.08), and inflight virtual reality (3.99). In conclusion, the majority of respondents show a high approval rate regarding the use of digital aircraft cabins.

Passengers' overall perception toward aircraft cabin digitalization

Results in Table 2 reveal that the majority of passengers perceive aircraft cabin digitalization as an important factor in improving their inflight experience (4.09). They highlighted that they will be strongly attracted to airlines with digitalized aircraft cabins over airlines with traditional aircraft cabins (3.99). This indicates that airlines with digital aircraft cabins will gain a competitive advantage over airlines with traditional aircraft cabins.

Passengers' willingness to pay to experience digital services

Results reveal that passengers have a high intention to pay extra prices to use the futuristic intelligent seats (3.78), and inflight virtual reality (3.45). However, they showed a moderate rate of agreement regarding their willingness to pay to experience a radiofrequency identification tag to track their luggage (3.7) (Table 3).

Hypotheses testing

A simple linear regression analysis was used to test the hypotheses. Table 4 shows the value of the standardized coefficient, their significance level, and the support for the acceptance of the hypotheses.

The results show that passengers' interest in using digital cabins has a significant impact on improving their inflight experience. The value of the standardized coefficient is.828 at sig =.000. This indicates that digitalizing aircraft cabins will contribute to improving the inflight passenger experience. Therefore, hypothesis 1 is supported.

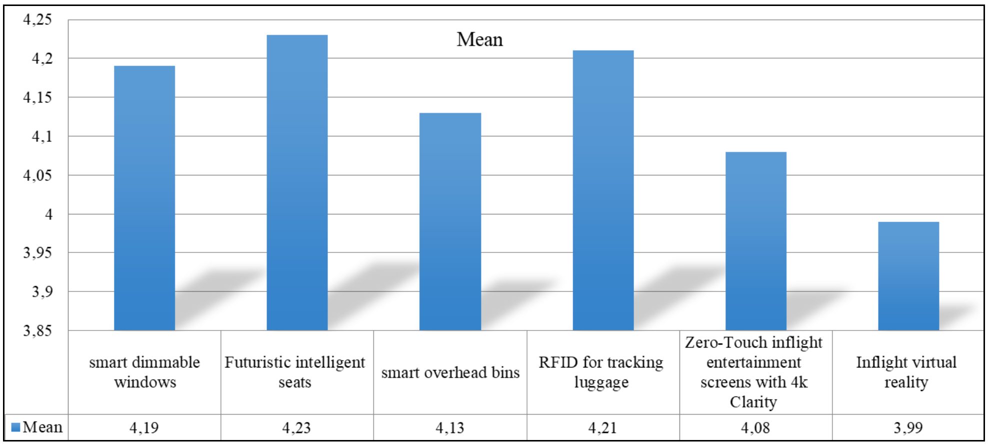

Figure 3. Participants' responses regarding their interest in using digital cabins

Table 2. Descriptive statistics of passengers' overall perception of digitalization

The Questions	Mean	Standard deviation
Digitalizing aircraft cabin components will improve my inflight experience.	4.09	0.79
I will be attracted to the airlines with digitalized aircraft cabins over airlines with traditional ones.	3.99	0.859

Table 3. Descriptive statistics of passengers' willingness to pay extra prices for inflight VR, futuristic intelligent seats, and RFID for tracking luggage

Futuristic intelligent seats	Mean	Standard Deviation
I have the willingness to pay higher prices to experience the futuristic intelligent seats.	3.78	1.036
RFID for tracking luggage		
I have the willingness to pay extra costs to use a radiofrequency identification tag.	3.7	1.124
Inflight Virtual Reality		
I have the willingness to pay extra costs to experience inflight Virtual Reality (VR).	3.45	1.187

Table 4. Results of the simple linear regression analysis to test the hypotheses
PI: passenger interest; DC: digital cabin; PAX: passenger; SEDW: smart electronically dimmable window; IS: intelligent seats; SOB: smart overhead bin; RFID: Radio frequency identification tag; IFE: inflight entertainment; VR: virtual reality

Hypotheses	**Path directions**	**Standardized coefficient**	**Standard errors**	**T statistics**	**Sig**	**Result**
H1	PI in DC → improves PAX experience	.828	.035	25.954	.000	supported
H1a	PI in SEDW → improves PAX experience	.579	.046	12.468	.000	supported
H1b	PI in ISI → improves PAX experience	.604	.047	13.318	.000	supported
H1c	PI in the SOB → improves PAX experience	.632	.047	14.322	.000	supported
H1d	PI in RFID → improves PAX experience	.648	.045	14.961	.000	supported
H1e	PI in IFE screens → improves PAX experience	.614	.042	13.670	.000	supported
H1f	PI in VR → improves PAX experience	.581	.040	12.544	.000	supported

The results indicate that passengers' interest in using smart electronically dimmable windows has a significant impact on improving their inflight experience. The value of the standardized coefficient is .579 at sig=.000. This means that employing smart dimmable windows inside aircraft cabins will improve the inflight passenger experience. Therefore, hypothesis H1a is supported. Moreover, the data show that passengers' interest in using the futuristic intelligent seat has a significant impact on improving their inflight experience. The value of the standardized coefficient is .579 at sig=.000. Thus, hypothesis H1b is supported. The results also show that passengers' interest in using Smart overhead bins has a significant impact on improving their inflight experience. The value of the standardized coefficient is .632 at sig=.000. Accordingly, the findings support hypothesis H1c. Furthermore, the results show that passengers' interest in using the Zero-Touch inflight entertainment screens with 4k clarity has a significant impact on improving their inflight. As the value of the standardized coefficient is .614 at sig=.000. Therefore, Hypothesis H1e is supported. The findings also show that passengers' interest in using inflight virtual reality has a significant impact on improving their inflight experience. The value of the standardized coefficient is .581, at sig=.000. Hence, Hypothesis H1f is supported. This means that applying inflight VR will improve the inflight passenger experience. Finally, the data show that passengers' interest in using the radiofrequency identification tag for tracking luggage has a significant impact on improving their inflight experience The value of the standardized coefficient is .648 at sig=.000. Thus, hypothesis H1f is supported.

DISCUSSION

According to the findings of the study, Egyptian frequent travelers in EgyptAir are highly interested in using digital cabins, which include smart, electronically dimmable windows, intelligent seats, smart overhead bins, radio-frequency identification tags for luggage tracking, in-flight virtual reality, and Zero-Touch in-flight entertainment screen with 4K clarity. Aircraft cabin digitalization provides passengers with a more individualized and interactive experience by allowing them to control their own space during flight. As a result, their flight experience has improved. This finding supports previous research conducted by Straker and Wrigley (2016), who highlighted that providing passengers with efficient and convenient digital services improve their in-flight experience and increase their engagement with the airline. By employing smart electronically dimmable windows in EgyptAir, passengers can control window shades by using smart touch buttons on screens, while preserving the view outside.

This will provide passengers with a sense of comfort and enhance their in-flight experience. With the adoption of smart overhead bins, passengers are provided with a clear visual indication of available space in overhead bins, which makes the boarding process more efficient and reduces isle congestion. Digitalization has also provided an advantage for travelers by allowing them to track their luggage by using electronic bag tags, which contributes to reducing their stress from losing their luggage during travel. Hence, increasing passengers' confidence in the airline and providing them with an improved experience. Moreover, the advantage offered by intelligent seats contributes to providing passengers with a unique travel experience.

Since they can monitor and control their seat conditions by using their phones. As well as, it is a smart solution to the issue of “legroom” in economy class seats. Additionally, aircraft cabin digitalization has made it possible for the airline to offer more entertainment options such as inflight virtual reality and Zero-Touch in-flight entertainment screens with 4K clarity which provide passengers with a more entertaining experience. Due to all the above-mentioned benefits provided by digitalizing aircraft cabins, the majority of passengers in EgyptAir showed a high intention toward paying to experience digital services in the aircraft cabin. This result is consistent with (D'Cruz et al., 2014; Patel and D'Cruz, 2017; Umashankar et al., 2017) who found that passengers are willing to pay more for better service and comfort on flights. In other words, the higher the quality of service provided to customers, the more they are willing to pay to enjoy that service. These findings could be a courageous indication for EgyptAir to invest in installing smart technologies in aircraft cabins without feeling worried that these high costs will not bring profits in turn. To sum up, by implementing digital services onboard, the airline's performance could be improved, accordingly improving the inflight passenger experience and maintaining passengers' loyalty to the airline.

CONCLUSION AND FUTURE IMPLICATIONS

This study adds to previous literature by providing a comprehensive and clear analysis of how aircraft cabin digitalization impacts passengers’ in-flight experience in EgyptAir and their interest level in using digital cabins in EgyptAir. The study also contributes to exploring the willingness of Egyptian frequent travelers in EgyptAir to pay to use virtual reality, futuristic intelligent seats, and radiofrequency identification tags for tracking luggage. The study findings provide several managerial implications that have the potential to improve the inflight passenger experience in Egypt Air. The study concluded that the majority of passengers in EgyptAir showed a high interest in using digital aircraft cabins and their influence on improving their inflight experience. Thus, decision-makers in EgyptAir should take broader steps towards digitalizing aircraft cabins to attract more passengers and gain a competitive advantage among global airlines. EgyptAir's decision-makers must understand the critical role of digitalization in improving passenger experience and increasing market share. Intense market competition and competitive pressure are major drivers of digitalization. Innovative technology can help the company increase its market share and achieve a competitive advantage. There is also potential to establish new business models, which might result in a variety of great benefits. Providers who principally deliver to overseas markets with more developed economies may discover that digitalization is a necessary prerequisite to staying in the market (Jorge and Di 2014). Based on our findings, smart electronically dimmable windows should be applied in Egypt Air's aircraft cabin to allow passengers to control the amount of light coming into the aircraft cabin while preserving the view outside. Additionally, smart overhead bins should be implemented to allow passengers to indicate the available space easier and faster and address the issue of boarding delays. Furthermore, economy-class seats can be replaced by intelligent seats since it will allow passengers to monitor and control their seat conditions by using their phones. In line with this, the majority of EgyptAir passengers expressed a willingness to pay a higher price to use intelligent seats and improve their seat comfort; this is an important finding that would encourage aircraft manufacturers to implement intelligent seats in aircraft cabins. While many airlines (i.e., Iberia, Alaska, and SunExpress) have succeeded in attracting a large number of passengers, maintaining their loyalty, and gaining a competitive advantage by employing inflight virtual reality, Egypt Air hasn't taken any steps to implement such technology in its aircraft. Passengers flying on these airlines have perceived inflight virtual reality as very entertaining and satisfying.

The findings of the study showed that the majority of passengers in EgyptAir are highly interested in using inflight virtual reality and have the willingness to pay extra prices to experience this technology; hence, EgyptAir should implement inflight virtual reality in its aircraft cabins to create a win-win situation for both the airline and the passenger. Regarding the inflight entertainment system, EgyptAir should introduce Zero-Touch IFE technology in its aircraft cabins. With Zero-Touch IFE, passengers will no longer need to touch the screen to select options; instead, they will control IFE from their cell phones by pairing their electronic devices with their seat-back IFE screen by connecting to Wi-Fi and scanning a QR code displayed on the screen. Furthermore, EgyptAir's in-flight entertainment screens can be improved by introducing 4K clarity IFE screens. EgyptAir can implement radio frequency identification tags for tracking luggage, but not as a priority since the majority of passengers showed a moderate agreement regarding their willingness to pay to use this technology. EgyptAir must adopt a digital culture, set a clear digital strategy, allocate a budget to implement these technologies, and renew its fleet with digital aircraft. Furthermore, EgyptAir needs to cooperate with some IT companies in the aerospace industry to develop their digital services. Passengers must be instructed on how to use these digital technologies on board. Hence, preflight safety instruction videos must be updated to instruct passengers on how to use digital technologies in aircraft cabins. We conclude that enabling passengers to control their personal space during the flight will positively influence their inflight experience, and this couldn't be attained without employing digitalization.

Limitations and Further Studies

Although the study provides theoretical and practical insights, several limitations should be noted. First, the study was limited to specific digital services in aircraft cabins that impact the inflight passenger experience (smart electronically dimmable windows, futuristic intelligent seats, smart overhead bins, radio frequency identification tags for tracking luggage, zero-touch inflight entertainment screens with 4K, and inflight virtual reality). Therefore, future research can investigate additional digital services inside the aircraft cabin that may influence the inflight passenger experience. Second, the population of this study was limited to Egyptian travelers who frequently fly with EgyptAir.

Thus, the results can't be generalized to travelers from other nationalities. Therefore, additional research needs to further investigate how passengers from different nationalities perceive digitalization inside the aircraft cabin. A structured survey can be conducted to target a mix of nationalities to obtain more comprehensive results. The majority of survey respondents in our study are from the youth segment, with ages ranging from 18 to 30 years. This indicates that the majority of passengers who are interested in using digitalization inside aircraft cabins are from the youth generation. In the future, it is suggested to have a balanced representative sample of the age group. Moreover, an extensive study can be conducted to examine the impact of passengers' age on perceiving digitalization in aircraft cabins. It would be remarkable to examine how passengers of various age segments value the role of digitalization in improving their in-flight experience.

Third, our research relied on the quantitative research method, while we did not use the qualitative research method. Therefore, we suggest using qualitative analysis in future research. For example, in-depth interviews with EgyptAir officials can be conducted to investigate the possibility of implementing digital aircraft cabins. Moreover, the observation method can be used to identify the latest technologies that have been applied in the EgyptAir fleet.

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