Revista Gestão & Tecnologia
e-ISSN: 2177-6652
revistagt@fpl.edu.br
http://revistagt.fpl.edu.br/

NEW SERVICE DEVELOPMENT PROCESS APPLIED ON AIR TRANSPORT INDUSTRY

O PROCESSO DE DESENVOLVIMENTO DE NOVOS PRODUTOS APLICADO À INDÚSTRIA DE TRANSPORTE AÉREO

PROCESO DE DESARROLLO DE NUEVOS SERVICIOS APLICADO EN LA INDUSTRIA DEL TRANSPORTE AÉREO

Luciana Padovez Cualheta
Administration, Ph.D. (University of Brasília – UnB), Administration Post-Graduate Program (PPGADM / FACE / UFG), Goiânia/GO, Brazil.
lucianapadovez@outlook.com
https://orcid.org/0000-0003-3893-6181

Mauro Caetano
Postdoctoral in Aeronautics Infrastructure Engineering (Aeronautics Institute of Technology - ITA) and Production Engineering, Ph.D. (University of São Paulo - USP). Administration Post-Graduate Program (PPGADM / FACE / UFG), Goiânia/GO
caetano@ita.br
https://orcid.org/0000-0002-5978-1054

Cristiano Farias Almeida
Transportation Engineering, Ph.D. (University of Brasília – UnB and Nagoya Institute of Technology, Japan). Faculty of Science and Technology / Transportation Engineering, Federal University of Goiás (UFG), Aparecida de Goiânia/GO, Brazil.
cristianofarias@ufg.br

Editor Científico: José Edson Lara
Organização Comitê Científico
Double Blind Review pelo SEER/OJS
Recebido em 15.02.2019
Aprovado em 23.04.2020

Este trabalho foi licenciado com uma Licença Creative Commons - Atribuição – Não Comercial 3.0 Brasil

Abstract

Objective of the study: This study aimed to identify what are the main activities in the new service development process (NSDP) for companies in the air transport industry;
Methodology / approach: Several PDNP activities have been identified in the literature, with a conceptual model being elaborated, whose activities were confronted with reality from multiple case studies carried out;
Originality / relevance: The air transport services is highly relevant to the global economy and has grown about six times the global GDP in recent years. Despite this, it is noted that managerial limitations in the provision of new services have been identified in the sector;
Main results: Based on the development of a conceptual model improved from practical cases, the results propose a model for the development of new services applicable to air transport;
Theoretical / methodological contributions: When comparing the results of the case studies with those identified in the literature, there are activities considered recurrent in the air transport industry, such as the analysis of the company's external environment and financial capacity, as well as new model activities , such as measuring market share and identifying new consumers;
Social / management contributions: The aim is to collaborate with the development of new services that can be useful not only in managing companies' innovation, but also that optimize efficiency in the sector;

Keywords: Air Transport, New Service Development, Service Innovation.

Resumo

Objetivo do estudo: O objetivo desse estudo consiste em identificar as principais atividades do processo de desenvolvimento de novos serviços (PDNS) aplicáveis às empresas de transporte aéreo;
Metodologia / abordagem: Várias atividades do PDNS foram identificadas na literatura, sendo elaborado um modelo conceitual, cujas atividades foram confrontadas com a realidade a partir de estudos de casos múltiplos realizados;
Originalidade / relevância: A indústria de serviços de transporte aéreo é altamente relevante para a economia global e cresceu cerca de 6 vezes mais que o PIB global nos últimos anos. Apesar disso, nota-se que limitações gerenciais na oferta de novos serviços tem sido identificadas no setor;
Principais resultados: A partir do desenvolvimento de um modelo conceitual aprimorado a partir de casos práticos, os resultados propoem um modelo de processo de desenvolvimento de novos serviços aplicáveis ao transporte aéreo;
Contribuições teóricas / metodológicas: Ao se comparar os resultados dos estudos de caso com aqueles identificados na literatura, há atividades consideradas recorrentes na indústria de transporte aéreo, tais como a análise do ambiente externo e da capacidade financeira da empresa, bem como novas atividades do modelo, como mensuração da participação de mercado e identificação de novos consumidores;
Contribuições sociais / gerenciais: Busca-se colaborar com o desenvolvimento de novos serviços que possam ser úteis não apenas na gestão da inovação das empresas, mas também que otimizem a eficiência no setor;

Palavras-chave: Transporte Aéreo, Desenvolvimento de Novos Serviços, Inovação em Serviços.

Resumen

Objetivo del estudio: El objetivo de este estudio es identificar las principales actividades del proceso de desarrollo de nuevos servicios (PDNS) aplicables a las compañías de transporte aéreo;
Metodología / enfoque: Se han identificado varias actividades de PDNS en la literatura, con un modelo conceptual en elaboración, cuyas actividades se confrontaron con la realidad de múltiples estudios de casos realizados;
Originalidad / relevancia: La industria de servicios de transporte aéreo es muy relevante para la economía global y ha crecido aproximadamente 6 veces más que el PIB mundial en los últimos años. A pesar de esto, se observa que se han identificado limitaciones administrativas en la provisión de nuevos servicios en el sector;
Resultados principales: Basado en el desarrollo de un modelo conceptual mejorado a partir de casos prácticos, los resultados proponen un modelo para el desarrollo de nuevos servicios aplicables al transporte aéreo;
Contribuciones teóricas / metodológicas: Al comparar los resultados de los estudios de caso con los identificados en la literatura, hay actividades consideradas recurrentes en la industria del transporte aéreo, como el análisis del entorno externo y la capacidad financiera de la compañía, así como nuevas actividades modelo, como medir la cuota de mercado e identificar nuevos consumidores;
Contribuciones sociales / de gestión: Este estudio busca colaborar con el desarrollo de nuevos servicios que pueden ser útiles no solo en la gestión de la innovación empresarial, sino también sino también que optimicen la eficiencia en el sector;

Palabras clave: Transporte Aéreo, Desarrollo de Nuevos Servicios, Innovación en Servicios.

I. Introduction

Given the contribution of services to the global economy, its development has become a priority for most companies (Johansson, Raddats, & Witell, 2019; Zhao & Di Benedetto, 2013). The Organization for Economic Co-Operation and Development reinforces the need for innovation in services to improve the sector's performance (OCDE, 2007). The results are monetary (increased profitability, sales, market share etc.) and nonmonetary (greater customer loyalty, improved brand image, etc.) (Thakur & Hale, 2013), which highlights the need for research about this topic.

Service innovation can be a result of informal processes without the existence of formal departments in companies, making it difficult to understand how the process is developed (OCDE, 2007). Despite its relevance, knowledge about service innovation is scarce and inconclusive (O'cass, Song, & Yuan, 2013). Product innovation literature has been used improperly in order to explain service innovation, demanding research specifically about services. Therefore, researching service innovation process contributes to the existing literature

and helps companies implement innovation.

Thakur and Hale (2013) have identified that most service innovation research are conducted in developed economies and on specific services industries, such as IT, finances and telecommunications. Sakata et al. (2013) have identified that service innovation research can be divided in basic research, related to management and in practice research that is related to mental health, medical services, public services and IT.

The air transport sector is responsible for over 50 million jobs around the world (IATA, 2014), and grew 12,2% in Brazil in 2014 (IGBE, 2014). About 1% of global GDP was spent in air transport in 2014 (IATA, 2014). The air transport industry grew six times more than the global GDP in the past forty years, but it is still not as profitable as desired (Pearce, 2012).

Beyond high costs, airline's low profitability is also related to inefficient process, slow adoption of new technologies, and mostly to the difficulties in providing differentiated services to customers (IATA, 2013). Air transport services have become commoditized as competition improves and the offerings are similar (Rothkopf & Wald, 2011). In addition to that, the sector is highly regulated (IATA, 2014) what can be a barrier to service innovation.

Research regarding service innovation in the airline industry has focused in service recovery, passenger satisfaction and loyalty (Akamavi et al., 2015), employees' service innovation behavior and its relationship different styles of conflict management (Lee & Hyun, 2015) and innovation priorities depending on the business model (Rothkopf & Wald, 2011). None of them describes the new service development process in the air transport sector, much less.

Given the above, the present study aimed to answer: what are the recurrent activities in the new service development process (NSDP) for the air transport sector? It contributes to the air transport service innovation literature and can be used as a supporting tool for innovation by air transport companies.

For this purpose, it is presented several service innovation models and frameworks, to understand their process and activities necessary to promote service innovation and propose a model that applies to the airline industry. Then, the case study is used as methodology to understand how these activities happen in practice and compare them to theory. Like Barczack et al. (2006) and Zomerdijk and Voss (2011) has been choose a qualitative approach, case studies, in order to understand the phenomenon in real situation.

II. Theoretical background

Kindstrom and Kowalkowski (2009) propose a new service development process

theoretical framework in four stages: 1) market sensing; 2) development; 3) sales; 4) delivery. The first stage involves scanning the customers, competitors, and the internal organization before addressing ideas to the development stages. In the development stage, ideas are generated, developed and tested. The sales stage depends on the competence of employees to convince customers to buy services or to deliver them in the right way. The delivery stage is simultaneous with customer interaction.

According to Sundbo (1997), the innovation process in service firms happens in four phases: idea generation, transformation into an innovation project, development and implementation. This does not mean that innovation is a linear process. The phases can occur repeatedly. New service development process has to be planned, reducing failure risks (Sundbo, 1997).

A theoretical NSDP has to be comprehensible, address the tactical and strategic levels of the organization, it has to be easy to see, trough pictures, and be generalizable. NSDP is the combination of human, technological, material and informational resources in order to develop a new service, considering the amount of time available and the desired quality (Harvey, Lefebvre, & Lefebvre, 1993).

In this context, Cheng and Krumwiede (2012) analyzed three organizational strategies regarding service innovation: customer orientation and consumer participation in innovation process (Melo & Damacena, 2015), competitor orientation and the formation of cross-functional teams. Customer orientation is highly related to incremental innovation, probably because clients can't predict how their needs will evolve and have a limited view of what they want. Because of that, customers can only suggest improvements in the services they already know (Cheng & Krumwiede, 2012)

Competitor orientation is related to radical innovation, probably because companies try to create new services and not improved ones when seeking to be different from their competitors. The formation of cross-functional teams is the best strategy when pursuing radical innovation as it allows the dissemination of information and ideas among several areas, sharing knowledge and distinguished vision, stimulating problem solving and creativity (Cheng & Krumwiede, 2012).

In order to plan innovation properly, it is necessary to consider factors that can hinder innovation. Thakur and Hale (2013) have identified and classified innovations barriers under three categories: economical, internal and external. Among the economic barriers, stands out

the companies' capacity of financing research, develop new services and react to competitors' actions. Internal barriers refer to the companies' ability of hiring, training and maintaining a qualified workforce, stimulating creativity and resilience. At last, external barriers are the ones companies cannot control, such as imitation risk and regulation imposed by the government.

Some of the tools and models that support service innovation are presented according to the literature aiming to propose a theoretical framework, which can be applied to the air transport industry. Studies exploring the innovation at this industry, as proposed by Oliveira and Caetano (2019) at the marketing side of airlines services, as well in Chen, Li and Liu (2019) about airline service quality, contribute with this industry in the identification of variables associated with innovation.

The Blueprinting is a tool designed by Shostack (1984) which allows the service to be seen as a whole and not by parts, increasing the speed of response to market demands, improving management practices and the success rates of the new service. The blueprinting principles help cut down inefficiency of random service development. The design shows execution time standards that can be monitored (Shostack, 1984). As employees are responsible for customer service delivery, recruitment, selection and training people is highly relevant.

Another tool that supports service innovation is the QFD – Quality Function Deployment that can reduce the risks and costs of the innovation process. It is a planning system that helps the decision-making process and the development of services that attend customers' needs. The QFD is a visual matrix represented by houses of quality as shown in Figure 1 (Stuart & Tax, 1996).

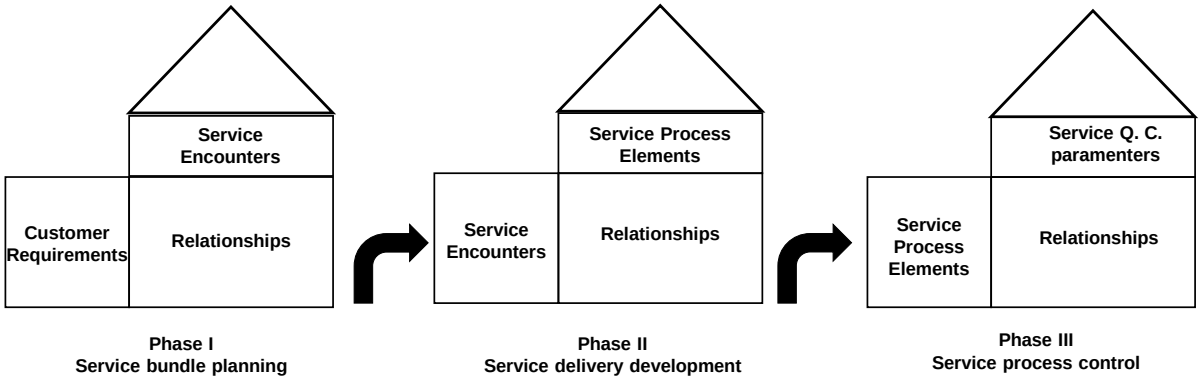

Fig. 1. Houses of quality.

Source: Stuart and Tax (1996)

According to Figure 1, in the first house the concept of the service is defined, and the clients' needs are presented with the moments of truth that can influence their satisfaction. In

the second house, the company must take a specific service encounter and define the elements that will satisfy the customers' needs for that encounter. It is also necessary to define the services' attributes and compare the company with competitors, defining priorities. Finally, in the third house, the gaps between clients' expectations and competitors' performance are analyzed in order to obtain competitive advantage (Stuart & Tax, 1996).

Another model presented in literature, the pre-requisites model, considers that the service delivery happens with costumer interaction. Edvardsson and Olson (1996) believe the company only provides the pre-requisites for the service existence as it is co-created with the costumer. Their model determines that the service has to be planned with three components: 1) Service concept; 2) Service process; 3) Service system.

In the first component, service concept, the service is prototyped, describing customers' needs and how they will be met. It must include customer and employee research, market research, financial analysis, cost prediction and the new service price. The second component, service process, involves the activities that must be performed to deliver the service in the right way. The third component, service system includes the necessary resources for the first component, such as workforce, customers, physical environment, and organizational structure. For that, employees must be recruited, trained and motivated, the physical structure must be adapted and the company must develop ways to disclosure the new service (Edvardsson & Olsson, 1996).

Cooper (2006) proposes a model named Stage-Gate, in which the new service is planned trough stages and gates, presented in Figure 2. Each stage describes a list of activities performed by the project's team. The gates are moments to decide whether to continue the project or stop it, according to the activities that have been developed.

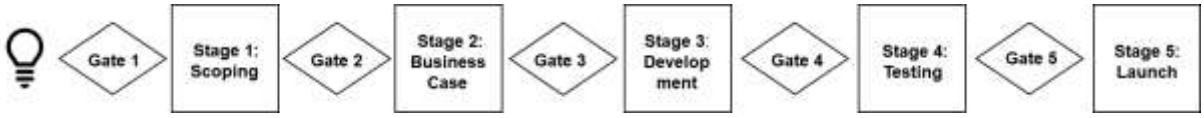

Fig. 2. Stage-Gate Model.

Source: Cooper (2006).

The initial idea is discovered trough brainstorming, technology roadmapping, market research, etc. The first gate decides if the idea is good enough to be developed. If the team decides to continue, the first stage will indicate the activities of the project. This goes on until

the new product or service is ready for launch (Cooper, 2006).

The tool suggested by Cooper (2006) is a supporting tool for long term decision process. It is represented by a roadmap and can help organizations survive during critical moments as it is simple and demands deep analyses (Phaal, Farrukh, & Probert, 2004).

Martin and Daim (2012) proposed a roadmap that can be used by services companies in eight steps, as presented at Figure 3. Expert panels should be used. The first should involve technologists that will identify key technologies (step 1), develop technology layers and timing (step 2) and define technology metrics (step 3). The second panel involves business experts that will identify business and market drivers (step 4) and identify objective and service initiatives (step 5). Step 6 is hierarchical modeling to make sure the new service is adequate to the organization strategy. In step 7, experts define the desirable metrics for each feature and step 8 involves the calculation of the technology service value for each emerging technology.

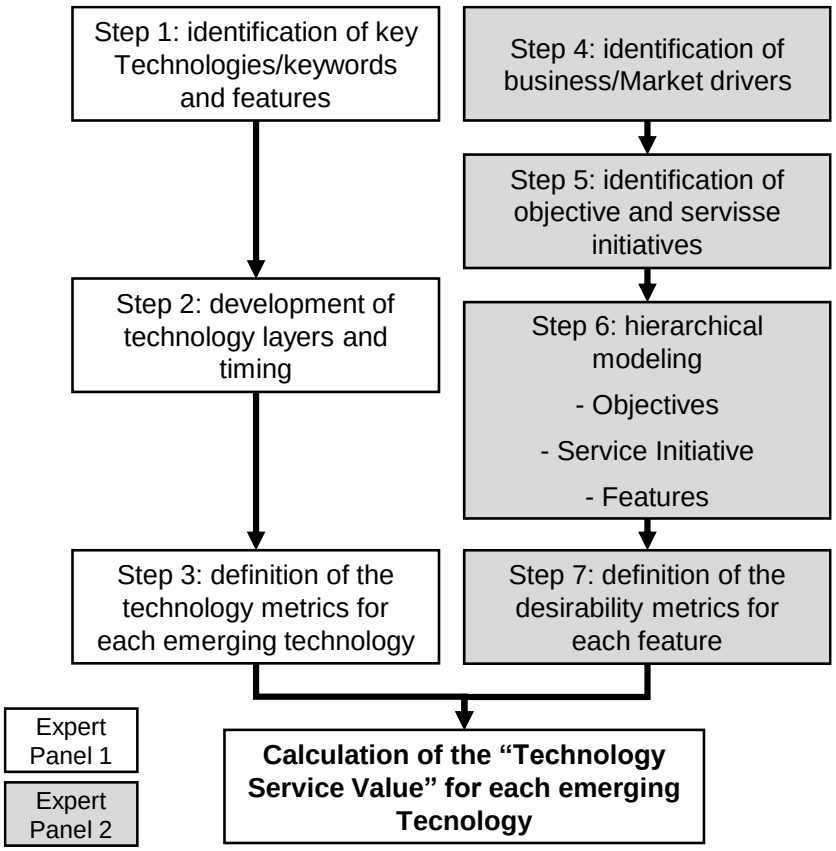

Fig. 3. TRM for the service sector.

Source: Martin and Daim (2012).

Complementarily to Martin and Daim (2012), Bettencourt, Brown and Sirianni (2013)

believe that most tools and models that support service innovation generate incremental innovation, but are not good enough for radical innovation because they are not focused on customer's motivation and don't co-create services with clients. The authors propose a job-centric model in four steps. In the first step companies must research their customers to understand what job they are trying to accomplish when hiring that service firm and the reasons underlying that wish. The firm needs to ask the right questions to obtain the right answers. In the second step, firms must determine if the service the customer is hiring is part of a larger process. If the service is part of a larger process, there may be other parts of the process that have been overlooked. In step 3, firms must determine what opportunities exist to get the job done. To do that, customers' expectations and services' outcomes must be evaluated. Finally, step 4 is about involving the right talents, time, teams, resources to create as much value for the customer as possible, differentiating from competitors.

These tools and models presented so far help the new service development process, but are not clear about how innovation results should be measured. Storey and Kelly (2000) propose that profit, sales' revenue, return on investment, market share, costs and sales' growth are financial metrics that help measure the results of service innovation. Other metrics are proposed, such as customers' satisfaction, new clients, customer retention, and competitiveness. Internal metrics are those related to efficiency, future potential, strategic alignment, employees' feedback and the development process itself (Storey & Kelly, 2000). Voss (1992) proposes other metrics, such as the impact on the company's reputation and identifying if the service generates superior results when compared with competitors.

The models and frameworks presented in the section make it possible to understand which activities are necessary when a company wants to innovate in services. Therefore, we propose a framework that contains those activities (Table 1), in order to understand which ones actually occur in practice. The activities are grouped in four phases (planning, designing, implementation and evaluation of the innovation's results).

III. Method

The case study method was chosen because this research is exploratory and we need to understand the phenomenon in real life (Yin, 1994). To ensure access, only companies in the city of Goiânia/Goiás/Brazil were contacted, ensuring that the research could be done in person. First, all air transport companies located in Goiânia/Goias/Brazil were contacted by phone or

mail to identify their interest and willingness to participate in the research. According to the Brazilian Nation Civil Aviation Agency (ANAC), there were twenty-two air transport companies in Goiânia when this research was conducted. Eight of those companies provided the contact of a possible respondent. Then, the researches contacted these possible respondents by phone. Four of them agreed to participate.

To ensure the study validity and quality, three sources of evidence were used: in depth interviews, observation and document analysis (Yin, 1994). The interviews lasted about sixty-five minutes and were tape-recorded after participants' permission and subsequently transcribed. The script for the interviews was previous elaborated from the theoretical framework in order to identify which of those activities were developed by the companies.

The observation was carried out in the companies' office and in the check in gates and boarding rooms in Goiania international airport (SBGO-ICAO/GYN-IATA) during one month. To perform document analysis, the companies' websites and social networks were searched to find the activities described in the theoretical framework.

The companies are here named A. B, C and D to protect their identities, as required by the participants. Company A was founded in 2003 and works with aircraft management, purchase and sale of aircrafts, domestic and foreign business aircraft attendance, and flight simulators. It is a small company, as it has 10 employees. The innovation in services reported by the company was the creation of an aircraft management service.

Company B was founded in 1976 and operated exclusively as an air taxi company. In 2006 it started to operate with regional flights, mainly in the north-central region of the country. According to the directory of ANAC (2014) the company has 176 employees and is classified as medium enterprise (SEBRAE, 2015). The company has ten aircrafts operating in thirteen destinations. The company's respondents reported the creation process of regional commercial airline's service.

Company C is in the aircraft market since 1986 and operates in maintenance and support services to aviation users. Among the maintenance activities, it works with inspections and repairs in airframes, overhaul engines, propellers and accessories, revitalization of interiors, design, and painting. It has 52 employees, so it is classified as a small business (SEBRAE, 2015). The innovative service reported by the company is the maintenance of aircrafts Embraer Phenom 100 and Phenom 300.

Finally, the Company D is an air taxi company specialized in air medical transport and was founded in 2004. According to the company's respondent it has twin-engine, turbo

propellers and jets for the carriage of sick passengers and operates in four bases (Goiânia, Palmas, Salvador and Macapá). According to the respondents of company D, it has about 40 direct employees and 40 more outsourced employees and it is considered a small business (SEBRAE, 2015). The service described by the company D was the creation of the air medical transport which coincides with the creation of the company.

The respondents of company A are both owners of the company. The respondents of company B are the transport manager and the commercial manager. The respondents of company C are both commercial managers. One respondent of company F is the company's owner and the other is the head nurse.

Data were analyzed using Nvivo software to find responses and data that fit into to clusters. Then, cases were compared with each other in order to find similarities and differences. They were also compared with the activities proposed in the theoretical framework, in order to find the recurrent ones in the air transport industry. The participants answers were translated so they could be presented in this paper.

IV. Results

The case studies results were combined to the literature analysis to propose a framework for the new service development process (NSDP), which support the service innovation on air transport industry. In Table 1 the 35 activities of this framework and its sources are presented to each of the four phases proposed: Planning, Designing, Implementation and Evaluation of the Innovation's Results. The main activities considered by the companies analyzed are appointed.

Table 1.

Framework for the NSDP on air transport industry.

Phase	nº	Activity	Source	Company
PLANNING	1	Idea generation	Bettencourt, Brown and Sirianni (2013); Kindstrom and Kowalkowski (2009), Sundbo (1997), Cooper (2006).	-
	2	Sense the internal environment	Bettencourt, Brown and Sirianni (2013), Edvardsson and Olson (1996), Kindstrom and Kowalkowski (2009).	-
	3	Sense the external environment	Bettencourt, Brown and Sirianni (2013), Cheng and Krumwiede (2012), Edvardsson and Olson (1996), Kindstrom and Kowalkowski (2009), Stuart and Tax (1996).	A, B, C, D
	4	Alignment with organizational strategy	Cheng and Krumwiede (2012), Martin and Daim (2012), Sundbo and Gallouj (1998).	D
	5	Analysis of the company's financial capacity	Edvardsson and Olson (1996), Thakur and Hale (2013).	A, B, C, D
	6	Identification of the technologies available	Martin and Daim (2012).	A
	7	Definition of a target market	Edvardsson and Olson (1996).	A, B, C
	8	Description of the desired results	Edvardsson and Olson (1996), Harvey, Lefebvre and Lefebvre (1993).	-
DESIGNING	9	Identification of workforces' needs	Sundbo and Gallouj (1998).	-
	10	Forming cross-functional teams	Cheng and Krumwiede (2012), Harvey, Lefebvre and Lefebvre (1993), Kindstrom and Kowalkowski (2009), Sundbo and Gallouj (1998).	B
	11	Describing how customers' expectations and needs will be satisfied.	Martin and Daim (2012), Stuart and Tax (1996), Sundbo (1997).	-
	12	Defining "moments of truth"	Bettencourt, Brown and Sirianni (2013), Flieba and Kleinaltenkamp (2004), Stuart and Tax (1996).	-
	13	Define which activities the customer will do alone	Bettencourt, Brown and Sirianni (2013), Flieba and Kleinaltenkamp (2004), Shostack (1984).	-
	14	Creation of support activities	Flieba and Kleinaltenkamp (2004), Shostack (1984).	A, B, C, D

	15	Define a default execution time	Bettencourt, Brown and Sirianni (2013), Flieba and Kleinaltenkamp (2004), Shostack (1984).	-
	16	Decide which technology to use	Martin and Daim (2012).	A, B
	17	Cost Description	Edvardsson and Olson (1996).	B, D
	18	Setting the new service price	Edvardsson and Olson (1996).	A, B, C, D
IMPLEMENTATION	19	Employee training	Edvardsson and Olson (1996), Kindstrom and Kowalkowski (2009), Shostack (1984), Sundbo and Gallouj (1998).	A, B, C, D
	20	Workforce motivation	Sundbo and Gallouj (1998).	B
	21	Market test	Sundbo (1997), Cooper (2006);	
	22	Adaptation of the physical structure of the company	Edvardsson and Olson (1996), Flieba and Kleinaltenkamp (2004).	A, B, C, D
	23	Purchase of materials and equipment needed	Flieba and Kleinaltenkamp (2004), Shostack (1984).	-
	24	Disclosure of the new service	Edvardsson and Olson (1996)	A, B, C, D
	25	Customer explanation on how to use the new service	Bettencourt, Brown and Sirianni (2013), Edvardsson and Olson (1996).	-
	26	Evidence the benefits of the new service for the customer	Bettencourt, Brown and Sirianni (2013), Edvardsson and Olson (1996).	A, B, C, D
EVALUATION OF THE INNOVATION' S RESULTS	27	Calculation of the service contribution to the company's image	Martin and Daim (2012), Voss (1992).	-
	28	Measure sales growth	Storey and Kelly (2000), Voss (1992).	-
	29	Measure market share	Storey and Kelly (2000), Voss (1992).	-
	30	Compare the costs with planning	Storey and Kelly (2000), Voss (1992).	A, B, C, D
	31	Calculate the return on investment	Storey and Kelly (2000), Voss (1992).	-
	32	Obtain employees' feedback	Storey and Kelly (2000).	A, B, D
	33	Obtain customers' feedback	Storey and Kelly (2000).	A,B, C, D
	34	Identify new users	Storey and Kelly (2000), Voss (1992).	-
	35	Compare the results with competitors	Bettencourt, Brown and Sirianni (2013), Voss (1992).	-

As proposed in Table 1, the four companies analyzes, A, B, C and D, demonstrate that innovation in services is part of the strategy of the companies and gives them competitive advantage. In all companies process this process began with the discovery of a market

opportunity by the company's owners, and it was not formally structured. An approach applied on new product development is also presented by Cooper (2019) about the voice-of-customer opportunities.

For example, respondent A used to by a pilot, and he knew how difficult it was for companies to understand the plane and the costs involved, because that was not their core business. So, he had an ideia “I realized I could be more than a pilot. I could manage everything for the company that hired me: the pilots, the planes, the costs, the itineraries. I could innovate and start a new business” (Respondent A). Respondent B, argued they so a market opportunity. “We could offer better flight schedules. And, our planes are smaller, but we told customers that was an advantage, because they could enjoy the view” (Respondent B).

In company A, the external environment was researched through international trips. “We visited several countries, especially the USA, to know companies that provided services like ours. We wanted to learn” (Respondent A). In companies B and D the main activity was searching and understating the competitors. “I knew all the airlines for medical care in Brazil. I knew their strengths and weaknesses and I tried to provide a better service” (Respondent D). As company C works in aircraft maintenance, respondent C claimed they research the market all the time. “We stay tuned, trying to see which aircrafts will be sold in Brazil, so we’re ready for them” (Respondent C).

Describing the target market, as recommended by Edvardsson and Olson (1996) was performed by companies A, B and C. Companies A identified available technologies. Idea generation, internal environment analysis and cost description were not explicit quoted by any of the companies researched. In the planning phase companies C and D had to obtain ANAC’s approval for the service, which delayed the service deployment process. This is consistent with the Thakur and Hale's research (2013) by stating that high regulation may hinder or even prevent innovation in services.

All four companies had to create support activities. “We have a small airplane that we use as a support for the others, to solve a flat tire, for example. I also had to hire people for the administrative activities” (Respondent A). In company C, the support activities became a whole new service. “We had to create a system to remember the client to bring the aircraft for maintenance. That was for us, but now they see it as a very good service we offer” (Respondent C).

Companies B and D conducted the activity "cost description" and the four companies set the new service price, an activity recommended by Edvarsson and Olson (1996). This definition

of price in the four quoted companies is based on internal cost structure and research of competitors' prices, trying to keep up the competitiveness in the market.

Companies A and B detailed the activity about deciding which technology to use. In both companies these technologies were used in support activities with the creation of support software for performing the service. None of the companies researched quoted the definition of a standard time to deliver the services, as recommended by Shostack (1984). Company C mentioned that the pricing is related to the time to perform the service, but did not specify what is the default time.

According to Cheng and Krumwiede (2012) the formation of cross-functional teams allows the sharing of ideas and different views, increasing the creativity and the potential for innovation. Company B formed cross-functional teams to drive the process of innovation in services.

During the implementation phase, all companies conducted employee training. In Company A training seems to be informal, as respondent A says "training happens all the time. We're always talking to them, explaining how to do things, correcting as they do it". In companies B, C and D, training is also required by the regulation agency. In Company D, trained employees are also a way to differentiate from the competitors. They even posted that in a social network: "Our professionals are especially trained and are up to date with their knowledge, providing our customers with secure and reliable solutions" (Facebook post – Company D, 02/10/2015).

All companies had to adjust the physical and organizational structure of the company, as recommended by Edvardsson and Olson (1996). According to Sundo and Gallouj (1998) the motivation activities are as important as training for the service to succeed. Nevertheless, only the company B reported employees' motivation activities. Market tests, as reported by Sundbo (1997) were not explicitly quoted by any of the companies researched.

The evaluation of the results of innovation is not a simple task (Storey; Kelly, 2000). Respondents said they cannot relate directly related innovations in service with the increase in sales or in the market share, so they seek to use other ways to measure the results of innovation. All companies compare the costs incurred with what was planned. It is a financial metric. As recommended by Storey and Kelly (2000) and Voss (1992) financial metrics may be insufficient to measure innovation in services. In this sense, companies A, B, and D obtain feedback from employees regarding the performance of the service. All four obtain feedback

from customers through satisfaction surveys and company B measures the number of flights per clients to identify its growth.

During the evaluation of the results of innovation in company C, they realized that an activity was not well executed, which could negatively impact on the amount of the company's customers. Therefore, a new deal was made with Embraer to reassess the standards required by the company to ensure that the service would continue in the market.

Even tough services created by each company are different from each other and despite the companies have distinct characteristics, ten PDNS activities presented in the conceptual model were performed by the four companies. These activities are considered critical in this study for the process of developing a new service in the air transport industry, as the analysis of external environment, analysis of the financial capacity of the company, the creation of support activities, the new service price definition, employee training, adaptation of the physical structure, the disclosure of the new service, disclosure of the benefits of the new service for the customer, obtaining customer feedback and the comparison of actual costs versus planned costs.

V. Discussion

All four companies researched innovate in services, but do not have a specific department of the company dedicated to that. This is consistent with OECD (2007) by stating that the processes of innovation in services result from little formal processes, without specific departments to do so. In companies A and D, the owners informed, during the interviews, that the innovation processes were not planned in any way, contrary to the assertion of Shostack (1984) who believes that without planning innovation in services tends to fail. It's evident that the companies' owners or managers play a fundamental role in service innovation.

The cases analyzed hold a series of activities in the process of developing new services, but none of which uses any tool or support model. According to Shostack (1984), Stuart and Tax (1996) and Haucap, Rasch and Stiebale (2019), the use of innovation support tools can help reduce costs. All the studied companies did the analysis of the financial capacity of the company in the planning phase. Companies B and D also described the new service costs in details, as recommended by Edvardsson and Olson (1996). According to the Oslo Manual (2007), a key goal of innovation is to reduce costs, and not to increase them. So companies need to be aware of costs throughout the innovation process so they do not exceed the planned and end up discouraging future initiatives for innovation. Even with the mapping costs, companies B and D exceeded the planned costs of innovation.

During the planning phase, all companies performed the analysis of the external environment, seeking to better understand the competitors, to identify innovation carried out in Brazil and the world, and to identify potential opportunities for innovation. This activity is essential to competitiveness, as pointed out by Kindstrom and Kowalkowski (2009).

Companies A and D have identified gaps in the market and created a new company from this analysis, along with the new service. In companies B and C services were identified that were not offered by the competition, considered market opportunities. Competitors' orientation is one of the strategies proposed by Cheng and Krumwiede (2012), but unlike what is proposed by the authors, this strategy generated only incremental and not radical innovation in companies B and C.

Three of the four companies studied, A, C, D accomplished a planning activity that had not been quoted in the conceptual model. That is the development of partnerships. In Company A this partnership was carried out with maintenance companies, cleaning and fuel supply. Company C became a partner of Embraer and company D described the partnership with an engineering firm that was fundamental in creating and developing the air medical transport service. According to Dahlander and Gann (2010), companies can open up to partners motivated by financial or internal factors, such as the generation of knowledge. In the cases studied, company A was interested in getting discounts and better pricing policies, while companies C and D were interested in knowledge generation.

In the design phase, the only activity carried out by the four companies was the definition of support activities, as recommended by Flieba and Kleinaltenkamp (2004). This evidences that the service is not simply delivered to the client, requiring various sectors of the organization. These are mainly maintenance and administrative activities, such as contract management and operations, for example.

Company A held two activities in the design phase that were not described in the conceptual model. First, the company created an ancillary service to be able to deliver the main service. As customers did not know the aircraft management service, the company started to sell aircraft and then offered the management service to those buyers. Company A also created a thirty day experience contract so that customers could get to know the service and decide if they wanted to keep it.

The activities "Identification of workforce's needs"; "describing how customers' expectations and needs will be satisfied"; and "Defining 'moments of truth'" in the design phase

were not explicitly mentioned by any of the companies.

During the implementation phase, all companies conducted employee training which is according to Sundbo e Gallouj (1998). Training in companies occurs before the service is deployed for the first time or when a new employee is hired. All companies disclosure the new service, highlighting its benefits. Such disclosure is made primarily using online media, with a strong presence on social networks, generating interaction with consumers. This is consistent with the study by Rapp et al. (2013) who claim that traditional marketing methods are no longer sufficient to achieve engagement and customer loyalty. According to the authors the use of social media is fundamental to build customer relationships and strengthen the brand.

The evaluation of the results of innovation is not a simple task (Storey & Kelly, 2000). Respondents said they cannot relate directly related innovations in service with the increase in sales or in the market share, so they seek to use other ways to measure the results of innovation. All companies compare the costs incurred with what was planned. It is a financial metric. As recommended by Storey and Kelly (2000) and Voss (1992) financial metrics may be insufficient to measure innovation in services. In this sense, companies A, B, and D obtain feedback from employees regarding the performance of the service. All four obtain feedback from customers through satisfaction surveys and company B measures the number of flights per clients to identify its growth.

None of the companies calculated return on investment or compared the results with competitors. It is evident that there is no consensus about the evaluation of the impacts of innovation in enterprises, requiring further research on this topic.

Some activities found in the literature, like idea generation, sense of the internal environment, defining default time, identify new users, compare results with competitors were not practiced by any of the companies investigated. That can be due to the fact that they are small or medium enterprises, and because the owner or manager play an important role in service innovation in these companies and they may not think these activities are important, but that should be further investigated.

Regardless, service innovation was carried out by the four companies and some activities appear in all of them. They are: analyzing the external environment, analysis of the financial capacity of the company, the creation of support activities, the new service price definition, employee training, adaptation of the physical structure, the disclosure of the new service, disclosure of the benefits of the new service for the customer, obtaining customer feedback and the comparison of actual costs versus planned costs. These can be considered critical to the new

service development process in the air transport industry.

Still, some activities were performed by at least one of them and should also receive attention. They are: alignment with organizational strategy, identification of the technologies available, definition of a target market, forming corss-functional teamns, decide which technology to use, cost description, workforce motivation and to obtain employees' feedback. All the activities presented in this paper deserve consideration by the companies in the air transport industry and could work as a guide in their service innovation process.

VI. Conclusion

The present study aimed to identify the critical activities in the new service development process in the air transport industry. To achieve that goal, models and tools that support service innovation were identified, a framework was proposed from four case studies were conducted in air transport companies in Brazil.

Results indicate that innovation is part of the companies' strategies and even though the development processes occurs in different ways in each one of them, some activities that were highlighted in previous research were found in all four. They are: analyzing the external environment, analysis of the financial capacity of the company, the creation of support activities, the new service price definition, employee training, adaptation of the physical structure, the disclosure of the new service, disclosure of the benefits of the new service for the customer, obtaining customer feedback and the comparison of actual costs versus planned costs. Future research should try to understand how and why those activities occur.

This study contributes with the service innovation literature in the air transport sector and helps fill a gap identified by Thakur and Hale (2013) and Sakata et al. (2013) that demonstrated that the air transport industry is not commonly researched regarding service innovation. It has practical implications because it can be used by air transport companies that want to innovate, helping their development process. It can also be used by regulators or the government that want to promote innovation policies.

The present study researched only four air transport companies in Brazil. As a suggestion for future research, other contexts and companies should be researched, to verify if the activities occur again. It was not possible to confirm if the activities were actuality performed, because the case studies were *ex post facto*, which is a limitation of the study. Future research should

also try to understand how and why those activities are performed, increasing the understanding on this topic. Longitudinal studies are recommended.

Aknowledgments

National Council for Scientific and Technological Development (CNPQ) and The State of Goiás Research Foundation (FAPEG).

References

ANAC – Agência Nacional de Aviação Civil. (2014). Anuário do Transporte Aéreo: dados estatísticos e econômicos de 2013.

_____. Empresas de linhas aéreas regulares. (2014) Disponível em: <http://www2.anac.gov.br/arquivos/pdf/especializadas/regulares.pdf>.

Akamari, R. K., Mohamed, E., Pellmann, K., & Xu, Y. (2015). Key determinants of passenger loyalty in the low-cost airline business. *Tourism Management,46*, 528-545.

Barczak, G., Kahn, K. B., & Moss, R. (2006). *An exploratory investigation of NPD pratices in nonprofit organizations*, *23*, 512-527.

Bettencourt, L. A., Brown, S. W., & Sirianni, S. J. (2013). The secret to true service innovation. *Business Horizons, 56*(1), 13-22.

Chen, L., Lia, Y.Q. & Liu, C. H. (2019) How airline service quality determines the quantity of repurchase intention - Mediate and moderate effects of brand quality and perceived value. *Journal of Air Transport Management*, 75, 185–197.

Cheng, C. C., & Krumwiede, D. (2012). The role of service innovation in market orientation – new service performance linkage. *Technovation, 32*, 487-497.

Cooper, R. G. (2006). Managing technology development projects. *Research Technology Management, 49*(6), 23.

Cooper, R. G. (2019) The drivers of success in new-product development. *Industrial Marketing Management*, 76, 36–47.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy, 39*, 699-709.

Edvardsson, B., & Olsson, J. (1996). Key concepts for new service development. *The Service Industries Journal, 16*(2),140-164.

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review, 14*(4).

Flieba, S., & Kleinaltenkamp, M. (2004). Blueprinting the service company: managing service processes efficiently. *Journal of Business Research, 57*, 392–404.

Harvey, J., Lefebvre, E., & Lefebvre, L. A. (1993). Technology and the creation of value in services: a conceptual model. *Technovation,13*(8), 481-495.

Haucap, J., Rasch, A. & Stiebale, J. (2019). How mergers affect innovation: Theory and evidence. *International Journal of Industrial Organization*, 63, 283–325.

IATA - International Air Transport Association. (2013). Iata Economics Briefing nº10. Profitability and the air transport value chain. jun.

Johansson, A. E., Raddatsb, C. & Witell, L. (2019). The role of customer knowledge development for incremental and radical service innovation in servitized manufacturers. *Journal of Business Research*, 98, 328–338.

Kindstrom, D., & Kowalkowski, C. (2009). Development of industrial service offerings: a process framework. *Journal of Service Management, 20*(2), 156-172.

Lee, K., & Hyun, S. S. (2016). An extended model of employees' service innovation behavior in the airline industry. *International Journal of Contemporary Hospitality Management, 28*(8),1622-1648.

Martin, H., & Daim. T. U. (2012). Technology roadmap development process (TRDP) for the service sector: A conceptual framework. *Technology in Society,34*, 94-105.

Melo, B. S. & Damacena, C. (2015). Motivadores da Participação do Consumidor no Desenvolvimento de Novos Serviços e o Efeito Moderador da Autoeficácia. *Revista Gestão & Tecnologia*, 15 (1), 68-100.

Menor, L. J., Tatikonda, M. V., & Sampson, S. E. (2002). New service development: areas for exploitation and exploration. *Journal of Operations Management, 20*, 135-157.

OECD. Manual de Oslo. (2007). Proposta de diretrizes para a coleta e interpretação de dados sobre inovação tecnológica. 3. ed., Brasília: Eurostat/Finep.

O'cass, A., Song, M., & Yuan, L. (2013). Anatomy of service innovation: Introduction to the special issue. *Journal of Business Research, 66*, 1060-1062.

Oliveira, D. S. & Caetano, M. (2019) Market strategy development and innovation to strengthen consumer-based equity: The case of Brazilian Airlines. *Journal of Air Transport Management*, 75, 103–110.

Phaal, R., Farrukh, C. J. P., & Probert, D. R. (2004). Technology roadmapping – a planning framework for evolution and revolution. *Technological Forecasting & Social Change,71*, 5-26.

Pearce, B. (2012). The state of air transport markets and the airline industry after the great recession. *Journal of Air Transport Management, 21*, 3-9.

Rapp, A., Beitelspacher, L. S., Grewal, D., & Hughes, D. E. (2013). Understanding social media effects across seller, retailer and consumer interactions. *Journal of the Academy of Marketing Science, 41*, 547-566.

Sakata, I., Sasaki, H., Akiyama, M., Sawatani, Y., Shibata, N., & Kajikawa, Y. (2013). Bibliometric analysis of service innovation research: Identifying knowledge domain and global network of knowledge. *Technological Forecasting & Social Change, 80*, 1085-1093.

SEBRAE. Critérios de classificação de empresas. Disponível em: <http://www.sebrae-sc.com.br/leis/default.asp?vcdtexto=4154>. Acesso em: 20 out. 2015.

Shostack, J. L. (1984). Designing services that deliver. *Harvard Business Review*.

Storey, C., & Kelly, D. (2000). Measuring the Performance of New Service Development Activities. *The Services Industries Journal, 21*(2), 71-70.

Stuart, F. I., & Tax, S. S. (1996). Planning for service quality: an integrative approach. *International Journal of Service Industry Management, 7*(4), 58-77.

Sundo, J. (1997). Management of innovation in services. *The Service Industries Journal, 17*(3), 432-455.

Sundbo, J., & Gallouj, F. (1998). Innovation in service. Policy Research in Engineering, Sciense & Technology - PREST. Project Report S2.

Rothkopf, M., & Wald, A. (2011). Innovation in commoditized services: a study in the passenger airline industry. *International Journal of Innovation Management, 15*(4), 731-753.

Thakur, R., & Hale, D. (2013). Service innovation: a comparative study of US and Indian Firms. *Journal of Business Research, 66*, 1108-1123.

Voss, C. A. (1992). Measurement of innovation and design performance in services. *Design Management Journal, 3*(1).

Zhao, Y. L., & Di Benedetto, A. (2013). Designing service quality to survive: Empirical

evidence from Chinese new ventures. *Journal of Business Research, 66,* 1098-1107.
Zomerdijk, L. G., & Voss, C. A. (2011). NSD Processes and practices in experiential services. *Journal of Product Innovation Management, 28,* 63-80.
Yin, R. K. (1994). *Case Study Research: design and methods*. Thousand Oakes, CA: Sage.