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Optimization of Organizational Design

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Abstract

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This study aims to present new techniques that airlines can use in order to gain efficiency

through human resources allocation, to keep up on track with the challenging and

constant-moving environment of aviation industry.

As the classical hierarquical structure that dominates most of the airlines today is not a

prone environment for the changes proposed, researchers will explore human resources

optimization using the optimization software Lindo, mixed with concepts and techniques

of Agile Methodology, such as evaluation score and talent mapping to develop a model

for the best match between employees' and tasks of Avianca Brasil Project Department,

considering productivity and cost that will present the most efficient outcome.

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Chapter I

Introduction

This study proposes an innovative allocation model for Avianca Brasil Airline, seeking more efficiency in projects and processes by defining the optimal combination between employees and activities.

Project Definition

The world is changing too fast, and it does not take much time for us to observe significant changes in technology, demography, communities and other relevant areas, such as economy and job market. As this movement can be challenging and even threatening, performance-enhancing and progressive human resources management practices are being adopted by companies all over to world to improve their competitiveness in the global market (Zhao, 2018).

Taking in consideration this scenario, human resources management have a crucial role inside an organization's operation, bounded in ways of measuring performance, like Nine Box grid, or implementation of Agile Concept, technical skill mapping and others globally recognized tools.

The researchers understand that modern airline companies require new techniques in their work process in order to keep up on track, as they are inserted in a competitive, uncertain, challenging and constant moving environment and have the challenge to harness the best of future workers and sustain performance over time while still handling their needs and expectations in order to keep an attractive workplace.

Therefore, classical hierarchical techniques might not be able to handle all the variables and keep companies both efficient and attractive in the job market. With the high competitiveness and new technologies of today's world, the capacity to learn, adapt, and change are critical components of competitiveness (Martin, 2010).

According to a study held by Deloitte's Center for Integrated Research (2017), an inclusive and strategic role from Human Resources (HR) is necessary in this new reality, and managers will be required to apply leadership skills as an important part of the process. Those new capabilities will be essential for organizations which seek to generate a pipeline of future talents to help meet the organization's evolving needs.

This mindset shift between the traditional thinking and the new thinking explores aspects like talent acquisition, job assignment, development and company culture and it is presented in the table 1 below:

Employee Experience	Traditional thinking	New thinking	Considerations for crafting a new employee experience for the entry level [11]
Acquisition	*Campus recruiting for specific role *Hiring process focused on technical skills and specific prior experience *Job postings *Use of headhunters to source candidates	*Greater focus on broad spectrum of skills for candidates, including highly valuable "STEMpathetic" skills *Openness to engaging and evaluating candidates in new ways	*"Try-out" job simulations that involve working closely with others to solve a highly cognitive task *Hire based on both technical and cognitive skills, prioritizing the skills needed for the future roles
Assignments & job rotations	*Linear job progression *Increasing openness to lateral growth opportunities within an organization	*Desire for mobility diverse experiences, including global *Data-driven understanding of capabilities needed *Opportunities via internal crowd and ecosystem partners	*Thoughtfully define desired set of career experiences for the entry level *Create an internal crowdsourcing network that allows entry-level employees to work on smaller projects, exposing them to cross-functional and even local experiences
Formal development	*Mix of modalities, primarily focused on e-learning or live classroom *Focus on technical skill development for junior professionals	*Mix of modalities, including new experiential formats (e.g. case studies) *Accelerated soft skill development *Tacit knowledge passed down through apprenticeship	*Leverage simulation and gamification technologies to develop soft skills early on in employees' onboarding training *Enhance access to on demand nano-learning assets
Informal development	*Inconsistent mentorship and on-the-job learning	*Expected component of senior resource roles	*Create mechanisms to transfer tacit knowledge and experience (e.g. debrief sessions) *Expose entry-level

			worker to a variety of senior leaders
Culture	*Closed door, once-a-year feedback sessions *Flexibility and well-being programs seen as "nice to have"	*Open, transparent *Value flexibility and well-being	*Make paid time off, family leave, and wellness programs part of the core benefits package, not a "perk" *Encourage leadership to create open and transparent communication platforms and interact with entry-level employees
Acquisition	*Campus recruiting for specific role *Hiring process focused on technical skills and specific prior experience *Job postings *Use of headhunters to source candidates	*Greater focus on broad spectrum of skills for candidates, including highly valuable "STEMpathetic" skills *Openness to engaging and evaluating candidates in new ways	*"Try-out" job simulations that involve working closely with others to solve a highly cognitive task *Hire based on both technical and cognitive skills, prioritizing the skills needed for the future roles

Table 1 – Future Talent Pipeline: Deloitte's Center for Integrated Research

By not adapting to a new reality of constant changes, companies can lose productivity and professional attractiveness, leading to a higher turnover and worse results. Inside a constant-changing scenario, Miller (1977) stated that one need also to consider that the growth of organizations itself can create some dysfunctions due to the increase in size that can generate difficulties in detecting the roots of the decline, or at the very least, its primary factors, such as poor response to organizational challenges or failure to adapt to changes in the external environment (Fleck, 2009).

Among HR, leaders have an important role in organizational productivity, by managing the team based on technical skills. A while after globalization and the arrival of foreign companies in Brazil, skill-based management became a well-known concept in the mid-90s. It can be defined as a package of tools and processes that can be seen as the foundation to a strategic people management (Gramigna, 2007). Primarily, the concept proposes an identification of those skills that can leverage employees' efficiency. After that, HR and leaders evaluate employees against the desirable skill role-model based in their job description and address the strengths and gaps identified in order to enhance, decrease or eliminate them. The success of this concept is based on guiding and encouraging employees, after a concrete behavior/evidence, to eliminate aspects distant from what is expected and enhance others which are connected to the company's values, better customer experience, improving efficiency and generating better results (RH Portal, 2015).

Although human resource management has many complexities involving subjective, unpredictable and non-quantifiable factors (Zhao, 2018), researchers see that these non-measurable points become a challenge for big companies. Our study aims to bring an Optimization Model to the complex routine of an airline that can dictate the best employee allocation, mixing ways to measure the subjective points of human resources, technical skills mapping and Agile Concept along with the rationality of optimization tools. The mix of these quantitative and qualitative tools seek to leverage companies to another level of effectiveness. This concept proposes a process to address critical business issues and questions by designing, prototyping, and testing ideas (GV, 2018).

Taking into consideration the agility driven mindset as a receptor of daily issues, multifunctional and high qualified professionals properly allocated, the researchers believe that the model proposed can improve processes across the company areas as it can be adapted accordingly to each department structure.

Project Statement

Usually, managers hope to keep the good, talented and well trained people as they tend to work better and more efficiently than their peers. However, the hierarchical organizational structure of Avianca is prone to a number of failures that undermine its efficiency as a whole, once it is responsible for bureaucracies that delay processes and generate dissatisfaction and frustration in people involved. It is easy to classify its structure as a hierarchical one by looking at its organizational chart, that shows the multiple levels of management within the company, as well as the specific departments that work together to accomplish the company's goals. However, as Avianca Brasil in not an open-capital company and do not have an internal structure available for investors, the researchers decided to bring an analog example that also show the presence of an hierarchical structure in aviation business:
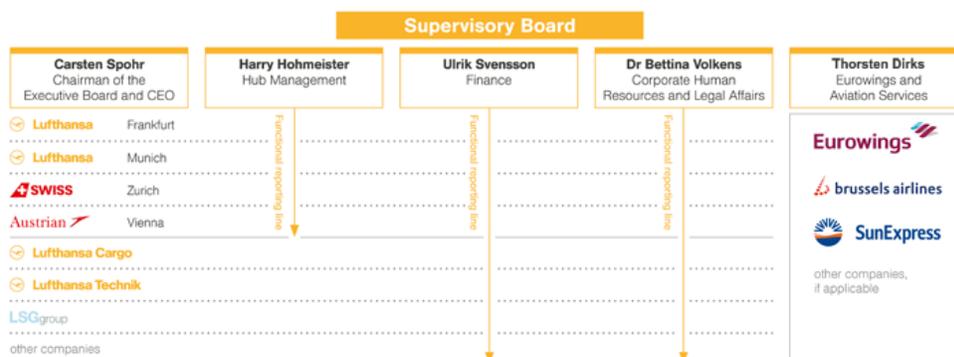
Figure 1 – Lufthansa Corporate Structure (Lufthansa, 2018)

Nonetheless, the hierarchical organizational design is not the only factor that can affect productiveness and employees satisfaction. Office politics, onerous bureaucracy, and micromanaging managers are also items that will get in the way to keep top performers engaged (Smith, 2016). Besides those organization-related factors, employee efficiency can rely on intrinsic motivations, such as moving up to a higher position, expectations, culture and so on (Zhao, 2018).

These organizational deficiencies are noticed in several aspects of the organizational structure and affect the living organism that makes the company work: people and their activities. The symptoms of this scenario generally appears as decreased level of communication (Almeida, 2009), and lack of interaction between departments, teamwork, knowledge and skills, among others.

In this line, the objective of this study is to present a model that will mix the quantitative output of the system of optimization Lindo that will provide the optimal allocation considering several variables and constraints and, after that, allocate resources considering the technical skills mapping that can identify the better resource for each requirement presented by a specific task.

For this study, Human Resources area plays an important role considering they are responsible for the Talent Mapping procedure that can generate relevant information about internal variables as employees' evaluation, salary, proficiency level of technical skills, and others which will be valuable input for Lindo and the model proposed.

Lindo's quantitative outcome, will be supported by the Agile Concept, meaning that decisions and actions must follow its statements to achieve organizational effectiveness.

Therefore, our study takes into consideration the scenario presented in this section and seeks to address the following questions:

1. Is there a guideline that considers the best allocation of top performers and/or key technical skills versus task complexity?

2. Does distinction (mindset, background, evaluation score, technical skills and salary) play an important role in task allocation and productivity?

Project Goals and Scope

Considering the presented questions, the researchers propose to apply an innovative organizational methodology in an optimization model runned by Lindo software, focused on increase the efficiency of the organization. It is important that the methodology can be further extrapolated to other areas of the organization.

To deliver this frame focused on optimization, our study will also consider the Agile concept to work Lindo's quantitative results.

Contributions Expected from the Study

This study aims to propose an optimization model based on two Human Resources Management tools: Nine Box and Technical Skills Mapping to better assign

employees to tasks based on their productivity and cost to execute the task, taking into consideration also the difference between tasks, in order to achieve more efficiency.

This model is expected to be flexible and applicable efficiently to several areas of the company and also promote structural effectiveness through:

- Structured guidance, once employees will have a clear perspective of what they should focus on

- Quick and accurate responses, connected to business dynamism

- Leverage the level of effectiveness

- Reduce cost when comparing the investments (C&B, infrastructure, efforts to integrate, etc)

Chapter II

Review of the Relevant Literature

As the purpose of this study is to address relevant questions about optimal employee allocation, chapter II focus on bringing references about internal and external influences, environment changes and concepts and/or tools that might help companies in managing human resources and dictating the best daily routine.

Threats and companies survival

The origin of success or decline of companies is based on several factors, some of them internal and some of them are related to the company-environment relationship. The researchers understand that the decline of a company is hardly based on a single factor, but in the combination of situations that will led to an unsustainable picture. Zammuto and Cameron (1985) pointed out the division between these factors of decline:

1. Internal: failure to work on people development; problems of adapting the hierarchical structure to a dynamic business model; inability to combine activities and resources.
2. External: decline of those who cannot switch to new activities and align challenges into models that are strong enough to keep companies at a high level of performance.

However, despite the difficulties, companies from various economic sectors have survived over the years, while others have failed. To better understand this situation, it is possible to cite two factors presented by Annosi and Brunetta (2017). That are related to

the organization: persistence and performance. The first being linked to the matter of survival and the second to the results achieved.

According to them, the organization that achieves both persistence and performance can be described as an effective organization, while companies characterized by persistence, but associated with poor performance are considered as a "Permanently Flawed Organization" (PFO).

In a similar view, Miller (1993) pointed out that organizational problems that threaten the company's survival may stem from the nature of the environment, an inadequate internal structure or even in an inadequate response to changes. Porter (1990) also emphasized the nation-state in which the firm is embedded, which can both stimulates and inhibits innovation, thus creating or discouraging competitive advantage. Therefore, one can conclude that innovation and adaptability to change are two very important aspects for the success of organizations.

As a clever way to address internal issues, Duncan (1979) pointed out that making clear the purpose for all employees is a very important process to show everyone how important it is to know where the company wants to go and what the company's ultimate goals are. Once the organization has a clear purpose and is able to disseminate it throughout, people feel more relevant, informed, and personally / emotionally involved. With this, the company can count on employees that are able to perceive and take advantage of the opportunities quickly. At the same time, leaders are also involved, providing feedback, coaching, autonomy, and guiding priorities and expectations. More than that, tasks are well communicated, clear and taken as a unique target.

Miller (1977) presented it as having a dynamic people model. According to him, under this model, a company has coherent leadership and a clear goal, making everyone follows the same objectives. Also, in this model, leaders do not control, they empower employees instead, improving property, and relying on solid purposes and visions to guide their actions.

Once leaders and non-leaders use the dynamic environment in which the company is inserted to learn the ability to innovate and operate in a more agile way, new tools can be applied to fix traditional methods such as annual planning and budget review, turning them into key objectives and results (OKRs) or small quarterly reviews, for example.

This mindset shift is responsible for changes in the way companies are structured today and the rising of new human resources techniques that seek to improve efficiency by identifying the best match between employees' profiles and skills and assigned tasks.

Talent management

To prepare the company for this kind of model, the talent management system should help employees to develop skills such as business motivation, ownership, decision making and performance as well. It also gives them the opportunity to be part of horizontal and/or vertical experiences that can make them more robust and prepared for the level of autonomy required.

Developing resources is critical for any organization, and this statement can be justified when taking a closer look at United States of America job market: more than

three quarters of manufacturers say that a scarcity of skilled workers is holding back their business. This information was collected and distributed by the National Association of Manufacturers in 2005 (Bednarek, 2014), stating that employers have a latent difficult to satisfy a growing demand for highly skilled workers.

The match between goals and resources is the key factor for faster process execution, effectiveness, employee' satisfaction and airline's success. In addition to technical skills development, technologies can be used to create, deploy, and support new solutions in a more effective way. Tools like hackathons and crowdsourcing can create a virtual collaboration to meet airline needs and create solutions quickly (Brabham, 2010).

Organization structure

An alternative focus when analyzing organizational daily dynamics and productivity is the way that structure is build. Originally, by concept, a company's structure is the way that an organization arranges people and jobs so that work can be performed and its goals can be met.

Duncan (1979) stated that organizational structure has essentially two objectives: facilitate the flow of information within the organization to reduce uncertainty in decision making and to achieve effective coordination-integration, or, in other words, efficiency.

The traditional approach of organizational structure is the vertical arrangement that came to dominate in the first half of the twentieth century. This model is easily represented by an organizational chart with a hierarchical or pyramidal structure with a major executive at the top, a small number of vice presidents or senior managements

under the president, several layers of management (the number of layers depends largely on the size of the organization), and the majority of employees at the bottom of the pyramid (Hill, 2012).

According to Dedahanov, Rhee and Yoon (2017) organizational innovation is an underlying factor that assists companies to survive in a constant changing world, and it is perceived as one of the means to achieve organizational success and competitiveness, as it helps organizations outperform competitors, excite customers and build new product portfolios.

Organization design therefore, is the art of allocating resources and people to specific purposes and structuring these resources to achieve an objective. In Burton and Obel (2018) words, organization design is indeed prescribing how an organization should be structured in order to function more effectively and efficiently. It is a systematic approach to align structures, processes, leadership, culture, people, practices, and metrics to enable organizations to achieve their goals.

Mathematical techniques can be employed to make organization design less subjective and more result oriented, as Francesco (2014) presented in his research focused on the optimization of the allocation of workers in container terminals. The study was based on external and internal operators shift and tasks complexity in order to serve vessels by contacting overtime workers in time.

The result was inner connected to the success of the industry once it increased productivity, decreases delays and labor costs. Outcome is valuable for the transportation industry, considering that, nowadays, 60% of freight transportation is performed by containers and the demand increase the competition between terminals.

Although one of the premises is that there is no best way of designing the organizational structure, as different organizations are not equally effective or efficient and thus respond differently to organizational models, optimization tools can help with the better resource allocation to different scenarios This introduces the concept of contingency thinking, where the organization should be designed to fit the particular circumstance, which may be new and not experienced before.

The design is also influenced by the life cycle of the organizations and, although organizations can change design over time, this can be challenging, especially when it requires moving to a new configuration of strategy, structure or controls (Westerman and Iansiti, 2006).

A strong and optimized organizational structure provides several benefits to an organization and help to mitigate business problems, as when they emerge, pre-indications often already exist within the design or some components of the organizational structure.

Organization design

Seeking more efficiency, many organizations are testing the so called post-bureaucratic organization designs. These new organizational forms can vary much from one company to another, or be dictated by the economic sector the company belongs to, but many of them include strategies for the faster coordination and decision-making that are necessary for successful adaptation and innovation. Examples of these strategies are continuous improvement, networking, decentralization, autonomous cells, self-management team and organizational learning (Duncan, 1979). Post-bureaucratic

organizational forms, such as the ones implemented by Agile, are supposed to give

organizations high-order capabilities to exploit new opportunities of adaptivity and

increased flexibility (Annosi and Brunetta, 2017).

Those strategies, retrieved from Agile Concept, are inner-connected to airlines,

as they are inserted in a very dynamic pace, demanding an organization structure that can

absorb the changes and be quickly responsive, encouraging rapid and continuous trade-

offs throughout the system.

British Airways is one of the companies using Agile development methodology

to speed up their software development and their return on investment by dictating that

software development projects should be conducted as a series of short interactions

known as Scrum (Agile Manifesto, 2001). In this methodology, projects are split into

cycles (typically monthly) called Sprints, and the functionalities to be implemented in a

project are kept in a list called product backlog, in this way it is possible to control when

the activities leave the rule and need to be corrected.

According to Mike Croucher (Information Age, 2010), the British Airways IT

head, once his IT employees learned that Agile methodology delivers value, it sooner

started to be implemented in departments out of IT fence, leading to new business

solutions, such as Revenue Labs that work to develop new ideas for revenue streams.

The agile concept was born right after the publication of the Agile Manifesto in

2001. The core principles presented by this methodology consider the interaction among

areas, rapidly change response and embraces a continuous learning mindset.

Created inside a Project Management and Software Development environment, at

the beginning, the agile concept aimed to help project teams deliver value in a faster and

agile way. In order to achieve this objective, the concept uses several tools as Scrum and Kanban, for instance, which can guide teams to the goal proposed acting like natural mechanisms for responding to chance quickly (Agile Manifesto, 2001).

It was confirmed in Mckinsey Quartely survey (2018) that only 10% of the 2500 worldwide companies in the scope of the study has completed an agility transformation. On the other hand, 75% of the organizations has agility subject as a top or top-three priority, which denotes to a shift that companies are doing in order to prepare themselves to the current world's scenario. It is a remarkable percentage, considering the recent introduction of the concept. In addition to that, most of them have higher aspirations for the future.

The Agile Manifesto has interesting principles directly connected to the commitment of feedback cycles and continuous improvement. Some of them target companies that, as the airline carrier considered in this research, are eager to achieve a more agile and productive structure.

Air Methods, an emergency air transport company based in the United States, uses the Agile practice to prioritize its backlog. According to Marney Andes (Funkhouser, 2016), the use of Agile is helping to communicate expectations throughout the business and creating more synergy within the work group. By getting to see what others groups are doing, they are not doing each other's work as they can see that some solution was already created for a problem they might be facing, therefore reducing re-work and waste of time.

Some general principles enhance the individual's interaction over process and/or tools, always focused on the delivery itself, its operational dynamics and customer experience throughout the journey, to help to accomplish the objectives:

- North Star embodied across the organization

It considers competitors, customers and suppliers as valuable sources from where it is possible to recognize the abundance of opportunities and co-create.

- Network of empowered teams:

Change the initial mindset which states that people need to be directed and managed to the future mindset that enhances protagonist by making clear responsibility, engage people and believing they will deliver exceptional results.

- Rapid decision and learning cycles

Leave behind the idea of a highly planned scenario in order to mitigate risks and move forward to a scenario where the key assumption is the inevitable change, therefore, the best way to minimize risk and succeed is to embrace uncertainty and be the quickest and most productive in trying new things.

- Dynamic people model that ignites passion

Leaders don't control, they empower employees instead. Enhancing ownership, confidence through a solid purpose and vision.

- Next-generation enabling technology

Use technology as an integrated tool in all organizational aspects and not only as a supporting capability. It means that technology can unlock value and enable quick reactions to business and stakeholder needs.

- Cross functional cells

Cell with a project/product owner that manages the delivery and prioritize actions. People are determined to assume functions and roles according to theirs previous background and expertise.

- Self-managing cells

In this case, cells components are free to prioritize lead (people and activities) according to the common definition of where the focus should be.

As the method is established, new types of cells can emerge from experimentation.

Dynamic of implementation

In order to understand better the concept of agility inside the organization, this study took into consideration the dynamic of a consulting company called Brainn.co based in São Paulo, Brazil. Brainn.co team is made by specialists that use Agile Methodology not only for startups but for big companies as well, therefore the routine is constructed inside the small cells they call "squads" focused on flexibility of scope and the Agile Manifest (Aragão, 2018).

The Team is composed by Product Owner (PO), Scrum Master (SM), Development team (DT), Support team (ST). The squad routine are made by four big steps Sprint Planning, Daily Meetings, Review and Sprint Retrospective. In each one of them the main propose of Agile Concept is to enhance and apply: the functional deliverables. The constant feedback, strong communication flow to stakeholders and several project releases during the process shows the adaptive approach and minimum-risk mindset, bringing a more assertive solution.

All those functions and project steps work synchronized in order to contribute for a communicative and agile environment, also focused on the best solution for the company.

Summary

The Literature Review section aims to present some key factors that can result in airline' success or failure, considering the volatile and complex scenario it is inserted. It presents how airlines structure tend to be rigid and hierarchical, and how it can be a problem inhibiting the rise of innovative techniques necessary to adapt the company to a challenging and competitive environment.

To overcome this situation, examples of different organizational designs, techniques of employees' performance and technical skills mapping were explored among trendy Agile concept as an alternative to achieve results expected in a fast and assertive way.

Chapter III

Methodology

The researchers' proposal is an optimization model to find the ideal organizational structure of the Avianca Brazil Project Department. Through the identification of the optimum point, this study tends to show that not necessarily having employees with the best grades and productive indicators is the ideal scenario for the company.

The model considers the following inputs to define the number of employees in each area function: the employee classification within the Nine Box tool, the salary and the number of people required for each activity, as well as the productivity of each employee class for each activity along with the expected minimum performance performance of each class of employees for each activity. With these variables in hand, researchers used Lindo Version 7 linear programming tool, which helped us to make the best allocation possible, considering the lowest possible cost with the maximum productivity desired. With this quantitative result it is necessary to cross the qualitative matrix of skills that was collected in the interview with the Avianca Brazil Project Department to select the employees who will be allocated in the activities. Finally, the researchers will use the concepts of the Agile methodology to guide the good practices of conducting and directing processes of the activities of the department.

The researchers conducted an interview section with two of the integrants of the Project Department. The manager and one of the coordinators contributed in giving information about the current structure and updated employee's requirements in terms of technical and soft skills. In this interview, the researchers also collected relevant information about their routine and specified the complexity of each pillar of activity, all

of them used as the input for Lindo or as qualitative information for the right allocation between resources and activities.

For the construction of the model, therefore, the first step is to categorize employees within the Nine Box tool to find the rank of each.

Nine Box Grid is a tool that has been adopted by many organizations as part of talent management. According to Lucy (2016), it is used to assign employees to one of nine boxes based on their current performance and future potential.

In the example below (figure 2), the axis represents three levels of performance and three levels of potential, and each organization has its own methodology to determine in which box an employee should be placed.

Ninebox – Nine different concepts are presented according to the combination of the level of potential and performance achieved.
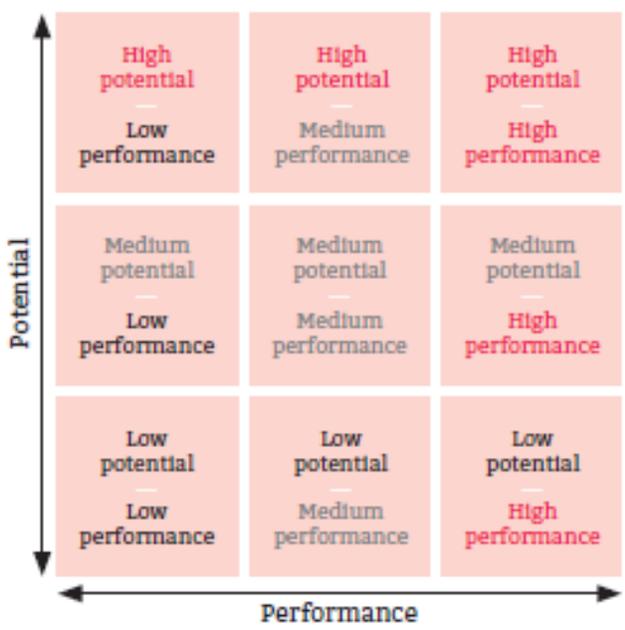
Figure 2 – Ninebox figure: Organizational Development, Lucy D.

For performance evaluation, organizations often add more information than just the goals established for the period of analysis. Avianca for example considers a set of four general skills plus three leadership skills, called "DNA Avianca", based on how much the employee is aligned with the company's overall talent management strategy. They are: Results orientation, Initiative, Team Work and Integrity.

DNA Avianca – Four required behaviors expected from employee's in Avianca

Figure 3 - DNA Avianca: Organizational Development, Avianca

Results orientation

- It is the ability to guide all actions in order to execute the expected results

- Excellent delivery, at the right time despite any potential interference or barrier and adapting quickly to organizational changes

• It is ability to optimize the use of available resources, maintaining the expected quality standard

• Ensure customer satisfaction and understand the daily activities impact on customers

Initiative

• Able to anticipate, proactively plan actions and consistently identify opportunities

• Long-term vision, which makes it possible to predict alternatives for action and guarantee sustainability in the proposals implemented

• Can predict and solve possible obstacles quickly

Team Work

• Ability to work with diverse areas and different audiences focusing on the organizational objective in a clear and transparent way

• Often acts in an empathetic way, putting his/herself in the other's place willing to accept different points of view while promoting sincere and constructive feedbacks

Integrity

• As integrity is an unmeasurable behavior, it is not included in employees' evaluation, even though it is a relevant aspect for the whole company

Considering not all the employees are leaders, this study will stick only to the aspects of the DNA Avianca that are required from everyone no matter what the hierarchical level is.

With these concepts in mind, through a calibration committee organized by the HR team and composed of several managers, the behavior and work performance of employees are evaluated through evidence, ranking them in one of the five levels of performance below, being 1 the lowest and 5 the highest.

Performance Level Description – For each score attributed to an employee there is a detailed description that matches to the performance and behavior observed

PERFORMANCE LEVEL	PERFORMANCE DESCRIPTION
1	Does not deliver goals even though it demonstrates some Avianca behaviors compared to peers
2	Delivers some goals and demonstrates at least half of Avianca's behaviors compared to peers
3	Delivers all targets and demonstrates all Avianca behaviors compared to peers
4	It often overcomes some goals and demonstrates all Avianca behaviors with a high level of excellence in at least half of them compared to the peers
5	Constantly exceeds targets and demonstrates all Avianca behaviors with high level of excellence compared to peers

Table 2 – Performance Level Description: Organizational Development, Avianca

With this classification, researchers were able to make the subjective data to enter into a range of measurements to measure in the optimization of people and activities, in search of the best productivity for the sector.

Employees will be categorized in the Nine Box Grid according to their final score based on Avianca's behaviors:

Ninebox Grid and Score – After evaluation each score attributed to an employee has a correspondent box in the grid

POTENTIAL		
2	4	5
2	3	5
1	3	4

PERFORMANCE

Table 3 – Ninebox Grid and Score

After the classification of each of the employees, the monthly salary range of each group is populated, according to the example below:

Average monthly salary – Average salary per month according to national search (CAGED, 2018)

SCORE	SALARY	
1	R$	4.000,00
2	R$	5.000,00
3	R$	6.000,00
4	R$	7.000,00
5	R$	8.000,00

Table 4 – Average monthly salary

From this data above, it is possible to create a table that shows us the minimum number of employees per activity. For this study, researches mapped activities from A to E, which stand for:

A – Project Management

B – Quality Assurance

C – KPI Control

D – Corporate Information

E – Management Systems

Each activity has a minimum need predefined by the manager of the area during the interview section. Numbers show us the minimum amount of employees necessary to perform each of its main activities in the sector, however at this moment, researchers are not sure that the company is taking full advantage of capacity and productivity.

ACTIVITY	MIN EMPLOYEE PER ACTIVITY
A	4
B	2
C	1
D	1
E	2

Table 5 – Minimum employee per activity

Then the researchers are able to measure the amount of hours spent to perform each activity depending on the group of employees, find the table below:

ACTIVITY	SCORE	HOURS
A	1	10
B	1	11
C	1	12
D	1	13
E	1	14
A	2	9
B	2	10
C	2	11
D	2	12
E	2	13
A	3	8
B	3	9

C	3	10
D	3	11
E	3	12
A	4	7
B	4	8
C	4	9
D	4	10
E	4	11
A	5	6
B	5	7
C	5	8
D	5	9
E	5	10

Table 6 – Hours spent in each activity considering different employee evaluation score

With this available information, the researchers were able to measure productivity per weekly workload for each group of employees, thus identifying the total productivity of each employee for each activity.

ACTIVITY	SCORE	PRODUCTIVE TIME TO EXECUTE	HOURS
A	1	3,40	10
B	1	3,09	11
C	1	2,83	12
D	1	2,62	13
E	1	2,43	14
A	2	3,78	9
B	2	3,40	10
C	2	3,09	11
D	2	2,83	12
E	2	2,62	13
A	3	4,25	8
B	3	3,78	9
C	3	3,40	10
D	3	3,09	11
E	3	2,83	12

A	4	4,86	7
B	4	4,25	8
C	4	3,78	9
D	4	3,40	10
E	4	3,09	11
A	5	5,67	6
B	5	4,86	7
C	5	4,25	8
D	5	3,78	9
E	5	3,40	10

Table 7 – Productivity per employee according to particular activity

From this result, the researchers crossed the indicators, result of the ninebox matrix, with salary collected from a union source, minimum number of employees per activity and the amount of hours spent to perform each activity.

ACTIVITY	SCORE	PRODUCTIVE TIME TO EXECUTE	HOURS	COST / PRODUCTIVE SALARY/PRODUCTIVE
A	1	3,40	10	1.176
B	1	3,09	11	1.294
C	1	2,83	12	1.412
D	1	2,62	13	1.529
E	1	2,43	14	1.647
A	2	3,78	9	1.324
B	2	3,40	10	1.471
C	2	3,09	11	1.618
D	2	2,83	12	1.765
E	2	2,62	13	1.912
A	3	4,25	8	1.412
B	3	3,78	9	1.588
C	3	3,40	10	1.765
D	3	3,09	11	1.941
E	3	2,83	12	2.118
A	4	4,86	7	1.441
B	4	4,25	8	1.647
C	4	3,78	9	1.853
D	4	3,40	10	2.059
E	4	3,09	11	2.265
A	5	5,67	6	1.412
B	5	4,86	7	1.647

C	5	4,25	8	1.882
D	5	3,78	9	2.118
E	5	3,40	10	2.353

considering a 40 hours/month workload

Table 8 – Cost per employee according to particular activity

After generating this initial output, the researchers developed a mathematical formula to be inserted into the Lindo software. Calculation was made through a linear programming, in order to distribute the best allocation to the Project Department at Avianca Brazil.

The software used for the optimization model is Lindo, a mathematical optimization system defined by Schrage (1986) as a software for linear programming, integer programming, nonlinear programming, stochastic programming and global optimization. It have been used by several organizations to maximize profit and reduce cost on decisions involving a large number of variables. The system is often used in models to optimize production planning, transportation, finance, resource allocation and more.

The Lindo system is a linear programming system, which helped us build a line of reasoned thinking in a mathematical language, researchers were looking for ways to find the best allocation at the least cost (employee score 1) in total staff to deliver a certain task that also would not be the most productive way. Mathematically, clustering can also be achieved using several OFs (Zhao, Li, Tan, Yang, Ge, & Dou, 2018).

With the help of the Lindo software, the researchers were able to identify the "optimal" point between the costs of personnel versus the need for productivity. The mathematical function, which helps us to explain the final calculation is listed as:

$$f = \sum_{i=1}^{5} (S_1 a_i + S_2 b_i + S_3 c_i + S_4 d_i + S_5 e_i)$$

S = Classification of each group of employees according to the evaluation of the

HR methodology used, where 1 = low productivity and 5 = high productivity

a = Classification of activities where each activity requires a minimum time to be

executed.

The mathematical function tells us: what is the minimum number of employees

per classification (HR methodology) that is needed to carry out the activities at a lower

cost and less time possible.

The idea is to combine performance ratings and lowest cost, aiming the maximum

efficiency. This objective took researchers to the study where qualitative data is

transformed into quantitative data using linear programming, looking for the point of

interchange between cost and productivity. In which researchers treat a fair balance

between the two variables that always walk inversely proportional, is the desired point of

the research.

The first part of our objective function is to identify the minimum possible cost by

adding all types of employees and their due activities by the "min" symbol. Next, the

salary (example 4000b1), combined with the activities (example 4000b1), combined with

the employee's note for the ninebox (example 4000b1) and added all possible

combinations of salaries, activities and notes of the ninebox.

Next, researchers insert the rule lines to ensure that Lindo gives us the best

possible combination, for this it is considered the following premises:

1. Based on Table 7 – Productivity per employee according to a particular activity, the researchers were able to calculate the average minimum required productivity per activity.

ACTIVITY	PRODUCTIVE PER ACTIVITY AVERAGE PER ACTIVITY
A	3,66
B	3,88
C	3,47
D	3,14
E	2,87

Table 9 – Average productivity per activity

2. Next, The researchers multiply the minimum number of employees desired by activity (Table 5 – Minimum employee per activity), with the table of productivity per activity (Table 9 – Average productivity per activity), generating the result of minimum productivity desired to carry out the activities

ACTIVITY	PRODUCTIVE PER ACTIVITY AVERAGE PER ACTIVITY	MIN PRODUCTIVE PER MIN EMPLOYEE MIN EMP. PER ACTIVITY / MIN PROD. PER EMP.
A	3,66	14,63
B	3,88	7,75
C	3,47	3,47
D	3,14	3,14
E	2,87	5,75

Table 10 – Minimum proactivity per employee according to particular activity

Finally, the researchers got a limited number of employees to use in the calculation, since not all employees have the same grade in the ninebox and not everyone is able to perform any activity at all. This rule was delimited according to some compulsory skills assigned by the Project Department manager (in the equation this is as example **a1 = 0**).

Find below the equation used in Lindo:

min
4000a1+5000a2+6000a3+7000a4+8000a5+4000b1+5000b2+6000b3+7000b4+8000b5+4000c1+5000c2+6000c3+7000c4+8000c5+4000d1+5000d2+6000d3+7000d4+8000d5+4000e1+5000e2+6000e3+7000e4+8000e5

subject to
3.4a1+3.78a2+4.25a3+4.86a4+5.67a5>=14
3.09b1+3.4b2+3.78b3+4.25b4+4.86b5>=8
2.83c1+3.09c2+3.4c3+3.78c4+4.25c5>=3
2.61d1+2.83d2+3.09d3+3.4d4+3.78d5>=3
2.43e1+2.62e2+2.83e3+3.09e4+3.4e5>=6

a1+a2+a3+a4+a5=4
b1+b2+b3+b4+b5=2
c1+c2+c3+c4+c5=1
d1+d2+d3+d4+d5=1
e1+e2+e3+e4+e5=2

a1=0
a5=0
b1=0
b3=0
b5=0
c1=0
c5=0
d1=0
d2=0
d3=0
d5=0
e1=0
e3=0
e5=0

END
GIN 25

As the final action, after identifying the optimal point between the costs of personnel versus the need for productivity, this study proposes a new operational dynamic. Once the key resources for the task are selected they should act based on the Agile Concept,

improving the effectiveness by acting with no hierarchy, communicating openly and freely, gathering all the involved parties to find the better solution and delivering value in a faster and agile way.

After this action, it is possible to see that there is still a problem in the solution, considering that not all the employees have the necessary skills to perform the assigned task. That is the reason this model also requires a qualitative analysis of each employee skills through the table below:

JOB SKILL PROFILE				

Position title	PMO Analist IIIA			

	Technical	Level Prof.	Capabilities	Level Prof.
	PMI	4	Comunication	4
	PDCA concept	4	Detail oriented	3
Skills	Logic	4	Proactive	5
	Response Timing	4	Resilient	4
	Execution Timing	4	Focus oriented	4
	KPI Monitoring	3	Team Player	4
	KPI Analysis	3	Confidenciality	4

Description: Level of proficiency	1	Minimal exposure	No exposure / Not required
	2	Fundamental	Knows and applies when necessary
	3	Able	Has such knowledge and has the ability to apply it with autonomy
Proficiency level assessment must consider the scale described	4	Advanced	Has complete understanding; ability to teach others
	5	Mastery	Reference; presents a specialized level of knowledge

Figure 4 – Job Skill Profile Sheet

In this way researches managed to have the best distribution of employees per activity, and remembering that using the Agile Methodology to mark all good practices of how to conduct the activities until their conclusion.

Chapter IV

Outcomes

Based on the initial proposal presented, this study aimed to investigate the optimal allocation of human resources in the Project Department of Avianca Brasil. Following the whole methodological concept mentioned in the previous chapter, our proposal mix qualitative and quantitative measures to offer a better distribution of employees with the objective of seeking the best efficiency and consequently a better result.

To deliver a better result, several employee variables were considered. One of these is the nine-box score, which is a methodology used to evaluate the performance of the organization's employees, evaluating the professionals in two parameters, their past performance and their future potential. In the Cartesian plane (x, y), in one axis of the Nine Box the performance is placed and in the other the potential (Lucy, 2016), focusing especially on this study, the adopted performance level considers 1 (min) to 5 (max) scores to rank employees.

The result, when one considers only the performance level aspect, is that the higher the grade, the more productive and efficient the team would be. In business in general and especially in the airline industry, to have highly qualified employees, it is necessary for the company to have a high investment (which, in this case, called cost). Therefore, researchers consider that investment (cost) is inversely proportional to high efficiency (Weeb, 2004). Thus, from the presented result, the researchers added hourly productivity classification and crossed all this information to evaluate the ideal distribution of employees to the department according to the variables (salary, hourly productivity, nine boxes and qualitative assessment of skills).

The researchers used the Lindo software to optimize the allocation solution, considering several aspects and restrictions already presented.

In the Final Result, the best employee allocation was found:

ACTIVITY	SCORE	TOTAL EMPLOYE
A	2	4
B	4	2
C	2	1
D	4	1
E	2	2

Table 11 – Optimal employee allocation

VARIABLE	VALUE	REDUCED COST
A2	4.000.000	5.000.000.000
B4	2.000.000	7.000.000.000
C2	1.000.000	5.000.000.000
D4	1.000.000	7.000.000.000
E4	2.000.000	7.000.000.000

Table 12 – Lindo Software output

This figure presents the total of employees allocated according to the note presented in the nine box, and the cost allocated by employees that will have to spend to carry out the activities.

The optimum point is identified with the balance between employees with high and low salary, performance and productivity. In this way the cost is the least balanced with the necessary productivity possible.

By presenting this data, the researchers addressed the two questions presented in Chapter I, meaning that a guideline of allocation has been developed and it considers performance, technical skills and different tasks as relevant aspects to achieve

productivity. Those variables play an important role in differentiating and allocating the right employee for each task.

Not only salary, productivity and performance are important aspects for the allocation and for the organizational productivity. It is necessary to combine this information to the talent map insights and the proficiency level of skills presented by each employee.

Lindo software presents an ideal employee profile, one or more, to be allocated in each task. This outcome profile is a result of the optimal combination that came from the variables inserted into the software and can match one or more employees available for allocation. So, with the Lindo's outcome in hands, the leader should qualitatively assess employees that match to the results and assign the one who better address personal skills to the skills required in the task.

Qualitative assessment should be made using the Job Skill Profile Sheet made for each one of the employees previously.

After the correct assignment, the study also proposes the application of Agile Concept as an alternative to dictate a daily dynamic focused on interactions between areas and results aligned with customer's expectation. Once allocation and methodology take place, Avianca will perform with high level of efficiency and mitigate risks through relevant gestures like: delivering value in a faster and agile way, frequent prototype releases for tests, real-time communications, face-to-face interaction, feedback cycles agenda and continuous improvement.

In this way, researchers are able to present an allocation model, as mentioned before, that seeks the best allocation of employees by activity crossing their skills

together with the lowest possible cost, bringing more efficiency in daily routine and tasks.

It is important to point out that, considering the sources explored throughout this study, it it possible to state that is no airline found that applies the optimal mix of qualitative and quantitative data for the human resources allocation in theirs activities. All of the concepts combined in this study are currently taking place as isolated tool in Brazilian airlines. Some of them are using the Nine Box concept, others measuring productivity or costs, and part of them mixing some of those tools and also assessing skills during talent mapping assessments.

In this way the study aims to offer a brand new and innovative proposal, combining the existing data with other new indicators and with that generating the final result more accurate and efficient.

Chapter V

Conclusions

Researchers conclude that following the recommended step by step, will generate the result of high productivity of the employees combined with the lowest possible cost (proportionally the criticality of the activities) marked with a methodology that guarantees high production and quality.

Following these steps and combining the results with talent skill mapping and the Agile Concept, companies will be able to combat the organizational gaps and issues as low productivity, unequal workload, lack of communication, lack of teamwork, slow decision making and lack of innovation, besides bringing all to a single goal.

In this way, the researchers conclude that the generated result indicates that the best diversification of employees is to distribute employees 2 and 4 so that it is possible to have a better balance between cost and productivity, but it is still necessary to use qualitative analysis of skills presented above as map of skills desired by activity and Agile methodology in order to guarantee the quality and evolution of the employees and their respective activities.

Recommendations

Our recommendation is to apply this study to any department of companies that have problems and difficulties in setting up a team with high productivity at the lowest possible cost.

In order to expand this study, researchers can include new variables for evaluating productivity as criticality of activities, measuring the quantity and quality of cross-referencing among necessary departments, and even apply the methodology to

departments that are not locally in the same physical space, for example in others states and countries.

Our recommendation is to apply this study to departments of companies that understand there is an opportunity to improve the way they set up a team with high productivity at the lowest possible cost.

Researchers recommend that the department studied throughout this optimization process, to generate critical mass and volume of data so it is possible to adjust the model and expand the tool to other departments in any airline. Part of the testing and retro feed process is the identification of soft skills that can be included in the initial mathematical formula as a constraint to the optimization. As an example, communication can be include once researchers and leaders clearly know what is the level of proficiency expected for each activity versus what employees are capable to deliver.

As a final consideration, researchers believe it is important to point out that even though the model proposes a very objective approach, information are collect from a talent mapping process that might include subjective perceptions. Therefore, if the talent evaluation has its gaps, the model can be directly affected in a positive or negative way, generating results which are not connected to the reality and current scenario.

Key Lesson Learned – the Researchers pointed out that there is no single recommendation for all airline to build a department. Just as to form a diverse team in terms of technical and soft skills and also balanced when considering characteristics needed for the tasks. The optimal mix must be supported by real and updated information about talent mapping once it will drive the outcomes of the model developed in this research. The success of the performance appraisal model is also a thorough evaluation of

the methodologies applied correctly, avoiding interpretations, to mitigate the

responsibilities at the end. The same rule applies to the formation of a department. It is

necessary to merge various methodologies to create one that fits ideally into the

company's goals.

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