Forecasting and Scheduling of Flight Deck Crew and Cabin Crew Headcount in SAUDIA Until 2025

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Abstract: Manpower planning is one of the most important key functions in any organization. It deals with putting the right number and kind of the people, at the right time in the right place to achieve the organization's objectives. It must be a system approach to plan the manpower in any organization. Flight deck crew and cabin crew are the heart of any airlines company. They need to be trained for months and years to be ready for their jobs. So, the airlines companies need to have a good manpower planning to forecast the future need and plan for their future. However, SAUDIA airlines has an ambitious plan to expand their network, open new destinations and increase the number of passengers per year in the near future. There are many factors was considered to predict the number of the needed cabin crew and the flight deck crew. Saudi Vision 2030 has a lot of ambitious plans to increase the number of pilgrims per year. Also, Saudi Vision 2030 focuses on the tourism industry in Saudi Arabia which will reflect on the demand for flights from and to Saudi Arabia. The study identified the needed manpower for the cabin crew and the flight deck crew until 2025 considering the monthly block hours for the last five years, percentage of augmented flight deck crew, type of the aircrafts, number of each type and the allowances as an input. The output was the number of the needed flight deck crew and the cabin crew till 2025. In addition, the future demand was predicted considering the plans in Saudi Vision2030. Network planning department in SAUDIA airlines was the source to collect relevant data. These data were analyzed using simple moving average forecasting. Additional to that, SAUDIA models were used to determine the needed manpower for the flight deck crew and the cabin crew until 2025. Finally, Saudi Vision2030 programs was considered in order to predict the future considering the present time events and their potential interaction. It is found that SAUDIA need to hire more captains, first officers, cabin managers and cabin attendants and prepare training plans to be ready for the future.

Keywords: Airlines, Manpower Planning, Saudi Vision 2030, SAUDIA, Flight Deck Crew, Cabin Crew

I. INTRODUCTION

Flight deck and cabin crew are the heart of any airlines' company. Flight deck crew is responsible for the flight, cabin crew, passengers and the aircraft. They have to ensure that all necessary checks are made before, during and after flights. On the other hand, cabin crew communicate with passengers and they provide excellent customer service to them while ensuring their comfort and safety throughout the flight.

This study aims to forecast the accurate number of the flight deck crew and cabin crew after five years which can help SAUDIA to hire the right number and prepare them to be ready to achieve the company's goals. This study will consider the aircrafts types and the number of each type, the historical block hours, Percentage of augmented flight deck and cabin crew and the allowances. Additional to that, it will consider the Saudi Vision2030 and their programs and SAUDIA expansion plans to predict the future demand.

The following will be included: statement of the problem shows the importance and needs of the research, objectives shows what will be accomplished after the research, the literature reviews shows what has been done in other researches about this topic, methodology shows how the objectives will be achieved to reach to the final results. Finally, results of the study will be shown along with its discussion.

Statement of The Problem

There are dynamic changes in aviation industry in Saudi Arabia such as increasing the number of pilgrims and tourists and opening new airports which will affect the demand on the airlines industry.

Objectives

1. Forecast the yearly block hours for SAUDIA until 2025 for each aircraft type.
2. Determine the number of flight deck crew for SAUDIA until 2025.
3. Determine the number of cabin crew for SAUDIA until 2025.

II. LITERATURE REVIEW

Stephen P. Juraschek have a study about the manpower planning for the nurse workforce in United States of America. The study shows that America has an aging population. With With an aging US population, health care demand is growing at an unprecedented pace. Using projected changes in population size and age, the authors developed demand and supply models to forecast the nurse job shortage in each of the 50 states. Letter grades were assigned based on projected RN job shortage ratios. The number of states receiving a grade od "D" of "F" for their nurse shortage ratio will increase from 5 in 2009 to 30 by 2030. There will be significant nurse workforce shortage throughout the country in 2030. Increased efforts to understand shortage dynamics are warranted [1].

Haipeng Shen have a study about call center manpower forecasting. It shows that the work is motivated by operation management of queueing system, in particular, telephone call centers, where accurate forecasting of call arrival rates is a crucial primitive for efficient staffing of such centers. their forecasting approach utilizes dimension reduction through a factor analysis of poison variables, followed by time series modeling of factor score series. Time series forecasts of factor scores are combined with factor loadings to yield forecasts of future poison rate profiles. Penalized poison regressions on factor loadings guided by time series forecasts of factor scores are used to generate dynamic within-process rate updating. Methods are illustrated using simulation and real data. The empirical results demonstrate how forecasting and dynamic updating of call arrival rates can affect the accuracy of call enter staffing [2].

Jonathan Lamas has a critical review of the current methods used to establish net future physician manpower requirements in Canada. The author explores specific examples of physician manpower

forecasting in Canada. The basic structure of all the published approaches to estimating physician requirements has been the same. It started by estimating the supply based on number of physicians or number of services. Then, estimate current requirements by adjusting this figure for any perceived gaps in current supply by means of Delphi judgements. After that, converts the resulting required complement into a physician to population. Finally, this ratio is converted to future requirements by adding physicians to account for attrition and population growth and subtracting physicians for immigration of foreign graduates. The assumptions of the methodology lead to serious biases in the outcomes of the exercise. The inadequacies of this approach to need handling the new dictates of fiscal restraint and limited growth in physician numbers [3].

III. METHODOLOGY

The Network Planning department in SAUDIA Airlines will be the source to collect relevant data. These data include the average historical block hours from 2015 to 2019. These data will be analyzed using simple moving average to forecast the block hours till 2025.

Then the data of the average training days for the cabin crew and the flight deck crew, no-show days for the cabin crew and the flight deck crew, maximum flying hours for each aircraft type for the flight deck crew and the cabin crew from 2015 to 2019 will be analyzed using SAUDIA models for the flight deck crew and cabin crew to determine the needed number of cabin managers, cabin attendant, captains and first officers till 2025.

Finally, Saudi Vision 2030 programs and SAUDIA expansions plans will be considered in order to predict the future demand for the airlines industry considering the present time events and their potential interaction.

IV. RESULTS

Forecasting block hours for next five years:

The study considers block hours (2015-2019) as inputs, block hours (2020-2025) as an output. Historical data are shown in the following table:

Table 1: Input (2015) Block Hours for (321 DOM)

Aircraft	T	Year	Month	block Hours
321 DOM	1	2015	Jan	6,829
	2		Feb	6,173
	3		Mar	6,848
	4		Apr	6,610
	5		May	6,902
	6		Jun	6,736
	7		Jul	6,855
	8		Aug	6,701
	9		Sep	6,568
	10		Oct	6,749
	11		Nov	6,404

	12		Dec	6,621

After applying simple moving average, the result is shown in the following table:

Table 2: Output (2020) Block Hours for (321 DOM)

Aircraft	T	Year	Month	Forecast
321 DOM	1	2020	Jan	9,333
	2		Feb	8,461
	3		Mar	9,411
	4		Apr	8,995
	5		May	9,413
	6		Jun	9,483
	7		Jul	9,604
	8		Aug	9,636
	9		Sep	9,351
	10		Oct	9,608
	11		Nov	9,259
	12		Dec	9,966

Applying SAUDIA model for Flight Deck Crew and Cabin Crew:

After applying SAUDIA model for flight deck crew, the result is shown in the following table:

Table 3: Flight Deck Crew Requirements for next (5) years

Position	Year					
	2020	2021	2022	2023	2024	2025
Captain	1490	1573	1656	1738	1821	1974
First Officer	1298	1370	1442	1514	1586	1720
Total	2788	2943	3098	3252	3407	3694

After applying SAUDIA model for Cabin Crew, the result is shown in the following table:

Table 4: Cabin Crew Requirements for next (5) years

Position	Year					
	2020	2021	2022	2023	2024	2025
Cabin Manager	1133	1181	1243	1306	1369	1431
Cabin Attendant	7767	8069	8457	8894	9231	9569
Total	8900	9250	9700	10200	10600	11000

Prediction using Saudi Vision 2030

Saudi Arabia launched 13 programs includes many plans, initiatives and objectives that aim to achieve the country's vision2030. There are many initiatives that must be considered to predict the number of

passengers per year for SAUDIA. One of the main programs that may affect the number of passengers is the Hajj and Umrah program which focus on increasing number of pilgrims to 30 million per year in 2030. Also, the public investment fund program is going to make huge investments in mega-projects such as NEOM, Alqeddya and the red sea projects and all of these projects aim to increase number of tourists in Saudi Arabia. Moreover, the national transformation program has a dimension includes many objectives aim to support the tourism and national heritage sector in Saudi Arabia. Finally, the quality of life program which aim to improve people lifestyle and the quality of the infrastructure in Saudi Arabia which will reflect on number of passengers per year in Saudi Arabia. The main initiatives in these programs will be shown in the next table:

Table 5: National Transformation Program

Program	Objectives related to airlines	Initiatives
Hajj and Umrah	Increase the number of pilgrims to 30 million	Electronic Visas Ease Visas procedures Open the New Taif Airport Prepare Yanbu Airport to serve the pilgrims Increase number of flights to Jeddah by other airlines Reengineering for the airport processes
National Transformation	Improve the Tourism industry	Electronic Tourism Visa Prepare AlUla as the largest open museum in the world Improve the meeting industry in Saudi Arabia
Public Investment Fund	To contribute in increasing number of Tourists in the mega-projects	NEOM project (5 million tourists by 2030) The Red sea project (1 million tourists by 2030) Alqeddya project
Quality of Life	Increase number of international flights	Build new terminals and airports to meet the demand Improve the air transport efficiency in Saudi Arabia
Quality of Life	To contribute in increasing number of tourists	Hosting 5-10 Sports events per year Hosting biggest cultural and entertainment events. Saudi Seasons

V. RESULTS AND DISCUSSION

The results show that SAUDIA need to prepare recruitment and training plan to meet its demand in the next five years. It shows that demand will be increased for the flight deck crew and cabin crew also. For example, the number of needed captains and first officers will be increased from 3-6% yearly in the next five years. According To BOEING, airlines will need 270,000 new pilots around the world in the next 5 years. Additional to that, there are a lot of factors that may increase this shortage for the pilots. Expensive and intensive training and safety requirements make it very difficult to enter this profession. For example, In USA, FAA relaxed the rules about the required flying hours to be a pilot

from 1500 hours to 1000 hours which may help the airlines to get pilots faster but on the other hand may affect people's lives if we keep relaxing these rules just to meet the demand. Moreover, the first officer needs 3-6 years to become a captain. In addition to the training plan, SAUDIA should prepare scheduling plans for the trainers and the appropriate infrastructure such as the simulators to meet the demand for the future pilots. In the next years, the forecasting shows that number of cabin attendant will be increased by 23.2% from 7767 in 2020 to 9565 in 2025. This means SAUDIA should be ready to hire more than 1798 new flight attendant in addition to the current crew in next five years. For the cabin manager, the needed employees will be increased by 26.3% from 1133 in 2020 to 1431 in 2025. So, SAUDIA need to hire or promote 298 flight attendants to cabin manager. For the flight deck crew, the number will be increased for the captains by 32.4% from 1490 in the next year to 1974 in 2025. So, SAUDIA need to hire 484 new captains in addition to the current number. This huge demand must be met by SAUDIA to achieve their transformation plan. Any shortage for the captains will reflects on SAUDIA transformation plans and financial results. For the first officers, the number will be increased by 32.5% from 1298 in 2020 to 1720 in 2025. So, SAUDIA need to hire 422 new first officers in addition to the current number. SAUDIA should be consider the turnover ratio, the current number of flight deck crew and cabin crew that may retire and the hiring and training processes and the required flying hours for each aircraft type in their fleet.

Perspective for Future Research

Researchers could go deeper and discuss in detail the external factors such as the competitors in the middle east and GCC countries. They can also study the economic and political situation in the region and how it can affect the manpower planning for SAUDIA. Also, they can make the study on the manpower planning for all the departments in SAUDIA instead of the cabin crew and flight deck crew only.

VI. CONCLUSION

Manpower planning is a process to determine the needed manpower requirements to achieve the organization's goals and strategies. In the airlines industry, the need for the cabin crew and the flight deck crew is increasing year by year. Moreover, the flight deck crew and cabin crew need a lot of time and money to be trained and prepared for their jobs. So, the airlines companies need to forecast the number of needed cabin crew and flight deck crew for the next years to prepare the hiring and training plans. There are a lot of inputs factors that affect the forecast for the needed manpower for SAUDIA such as the historical block hours, the yearly training days, no-show days and the maximum flying hours for each aircraft type. The network planning department in SAUDIA was the source to collect these data. These yearly block hours were forecasted by using simple moving average technique. Then, SAUDIA models were used to determine the needed number of the cabin crew and the number of the flight deck crew.

Finally, there a lot of factors will affect these numbers. For example, in Saudi Vision2030 such as focusing in tourism industry, increasing number of pilgrims. Also, there will be new airports in NEOM, Red sea project and Alfaisyalah near to Makkah. must be considered to predict the manpower in the future.

It's found that SAUDIA will need 1431 cabin manager, 9569 cabin attendant, 1974 captain and 1720 first officers by 2025. So, it's recommended that SAUDIA to prepare a recruitment and training plans to prepare the cabin crew and the flight deck crew. The recruitment plan by HR departments must

consider the retirement and the turnover ratio for the cabin crew and the flight deck crew and the needed number for the trainers. The training plan by Prince Sultan Aviation Academy must consider the equipment such as the number of the simulators that must be bought by SAUDIA.

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