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Evaluating Performance Competencies in the Royal Saudi Air Force Engineering Directorate and Squadrons

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EVALUATING PERFORMANCE COMPETENCIES IN THE ROYAL SAUDI AIR FORCE ENGINEERING DIRECTORATE AND SQUADRONS

THESIS

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Abstract

Nowadays, with the increased level of technology development, nations around the world are trying to enhance competitiveness by developing manpower skills. The promotion of job performance is becoming the main focus of many organizations seeking to achieve a long-term strategic advantage. To fulfill this requirement, organizations must carefully manage their employees' competencies and function with the best possible outcome. The Royal Saudi Air Force (RSAF) is certainly one of the most formidable military forces in the middle east, given that it operates and maintains a large fleet of advanced technological aircraft. As such, the effectiveness of tasks performed by the directorate of aeronautical engineering (DoAE) and the aeronautical engineering squadrons (AES) in RSAF directly impacts flight safety, which in turn influences the organization either positively or negatively. Therefore, improving employees' competencies will improve individual performance, have a positive impact on the safety of flight operations and enhance the overall performance of the organization.

The literature review suggested a model, namely a T-shape competency model, to assess the inefficiencies in collaborations between engineers working in the aircraft industry. To satisfy the aim of this study, the model was refined and reconstructed to reflect the actual practice of a military operating environment such as RSAF. As a means to gather data for this thesis, two different tools, a survey and an interview, were employed. The findings revealed some deficiencies in competency management and indicated that some employees are not fully competent to perform major activities yet. The study finally concluded with some managerial recommendations that might enhance competency management and, possibly, organizational performance.

To God, with whom all things are possible

To my country

To my parents

To my wife

To my kids

To my brothers and sisters

For their unweaving support

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Faisal Al Dawood

Table of Contents

List of Figures

List of Tables

EVALUATING PERFORMANCE COMPETENCIES IN THE ROYAL SAUDI AIR FORCE ENGINEERING DIRECTORATE AND SQUADRONS

I. Introduction

General Issue

For any organization with a goal to perform with the highest possible outcome, a competency management system is an essential part that should be implemented carefully within the overall management plan. In fact, a competency management system can be key to motivating employees within the organization as it defines the roles and responsibilities of each and every individual, creates a clear path for training and development that is aligned with the organization's goals, optimizes the hiring process and highlights the skills needed to execute tasks well (Tarigan, Basana and Suprapto, 2018). However, not taking advantage of such a system will affect the employee's performance and surely the overall performance of the organization (Hart, 1998), especially when it comes to a critical organization such as the Air Force. Air Forces around the world rely heavily on an aircraft's capability and availability, and to meet that requirement, first-line (organizational maintenance), second-line (intermediate maintenance) and third-line (depot-level) have to be competent enough to ensure all tasks are handled professionally and efficiently.

The Engineering Directorate and Squadrons of the Royal Saudi Air Force are responsible for accomplishing the essential aircraft capability certifications and approvals within the organization in accordance with operational needs. The Royal Saudi Air Force (RSAF) has seen significant changes as a military force in the sorts of missions and operations it must do. Furthermore, as an organization that uses modern technology like airplanes, software, equipment

and simulators, it is critical to get the knowledge and competencies required to be able to operate, maintain, repair and certify such technologies.

Problem Statement

In the Royal Saudi Air Force (RSAF), there are a dedicated engineering directorate and squadrons responsible for activities such as clearances, modifications, damage repairs, investigations and any complicated issues that arise outside of the technical orders. These activities are vital to operational readiness because, as a defense force, RSAF has a mission to fulfill all tasks and requirements in the most efficient manner. All things considered, performance against complicated issues has not been ideal in recent years, especially when it comes to engineering solutions. In some cases, the engineer handling a major case will either struggle to come up with an appropriate solution or end up with an inaccurate conclusion. The high chain of command in RSAF is concerned about this issue, and questions whether the problem is inherent with the employee himself or existed within the management system. Therefore, identifying the core issues will eliminate the confusion and clarify the way forward in improving organizational performance.

Research Objectives/Questions/Hypotheses

The aim of this research is to identify the lack of competency in some of the employees that resulted in low organizational performance. Potentially, this research will provide a recommendation based on the analysis of the data collected and provide, if possible, a competency model to be implemented.

The research questions are as follows:

1. Is there a competency framework implemented within the Directorate of Aeronautical Engineering (DoAE) and the Aeronautical Engineering Squadrons (AES)?
2. How does the current competency management system impact employee performance?
3. How does the frequency of task accomplishment and training impact competency degradation?
4. Can competency assignments be reallocated to enhance system performance?

For the research hypothesis, it is obvious that RSAF wanted to improve the depot level performance and gain a further understanding of the current issue. Thus, this research is designed to assess the hypothesis that low organizational performance is caused by a lack of competencies.

Research Focus

This research will purely focus on the employees and managers working in the Directorate of Aeronautical Engineering (DoAE) and Aeronautical Engineering Squadrons (AES). Both DoAE and AES are man-powered with over 100 military and civilian engineers.

Methodology

The methodology chosen for this research is a mixed approach, and a detailed justification and explanation of the chosen methodology will be provided in a later chapter. Thus, the mixed methodology tools that are going to be utilized in this study are a survey and interview. A set of questionnaires and semi-structured questions will be established to gather as much data as possible from employees (to diagnose current issues and status) and managers/leadership (to identify what are the current management practices and future measures)

working in both DoAE and AES. The survey will be conducted using an advanced online application for faster data collection and analysis, whereas the interview will be recorded for thorough data analysis to gain further understanding and generate a conclusion.

Assumptions/Limitations

Part of this study is to understand the behavior of employees towards their day-to-day activities. Taking that into consideration, the employees may resist the idea of conveying the actual scenarios fearing the consequences that might affect their role in the organization. Openness towards the survey is optimum to achieve the targeted results. Therefore, the confidentiality of the data collected is critical.

Implications

This research highlights the current issues experienced in DoAE and AES, a further management changes can be made to enhance the performance of the employees and potentially consider implementing a new strategy.

II. Literature Review

Chapter Overview

The chapter begins by introducing the reader to the distinction between competency and performance, the various categories of competency, and the different approaches that have an influence on professional competencies. It also discusses the significance and complexity of aircraft engineering and maintenance organizations. Finally, it explains the T-shape competency model and its relevance to this research.

Background

In the first instance, it is important to understand why we should worry about performance based on competency. How competency can alter the performance of the organization, and to what extent? Competence has a strong connection with the capacity to execute well in a variety of situations (including dealing with unexpected events) and contexts. As a result, a high-quality performance entails using 'knowledge for the selection of alternatives' to determine the optimal course of action for each situation (While, 1994). According to Hart (1998), organizations with performance-based environments have more advantages in achieving their goals as that environment motivates employees to take on new challenges and improve their skills, and most importantly understand the best behavior that they should demonstrate and model. Therefore, organizational management standards should describe all the requirements needed to achieve optimal performance in the workplace (Tarigan, Basana and Suprapto, 2018). Additionally, organizations need to accurately understand the competencies and skills of their employees, so that they could identify, assign and relate to all demands that they need to respond

to. However, wrong decisions in this regard can result in significant undesirable outcomes and thus poor performance (Fazel-Zarandi and Fox, 2013).

Performance and Competence Distinction

Anything that can be done could be described as a performance, but it does not reflect competency. Being sick, exhausted, intoxicated, nervous, or preoccupied are just a few examples of the many factors that might cause performance to lack competence (Sternberg, 2015). Although the concept of competency may seem straightforward, it actually involves some complexity. The common understanding of competency is the involvement of skills, abilities and knowledge, referred to as the foundation of competency, that is related to work. Consequently, a set of competencies are also related to the foundation of competency but necessary to assess an individual's suitability for a task or profession (Polite-Wilson, 2013). According to Wu, Liang, Liu, and Regina (2018), competence has been acknowledged as a significant independent variable of job performance, which explains the relationship between the two. The author further highlighted that many researchers have approached this relationship in a variety of job fields, however, current researchers have not given much attention to the direct effect of employees' competence on job performance and its internal mechanism yet. Additionally, it is important to differentiate between competency classifications to determine which competency is primary to the job and the expectations of the employee doing the job. Thus, the following table from Carlton advanced management institute outlines the five categories of competency.

Table 1 Carlton advanced management institute competency category

Competency	Description	Example
Core Competency	Organizational competencies that all individuals are expected to possess	Teamwork, communication skills, flexibility
Professional/Functional Competency	A set of competencies that are related to the job title or occupation	Engineers have different competency sets than teachers
Behavioral competency	Competencies that are required by people in terms of behavior	Positive attitude, trust
Threshold competency	Characteristics required to perform a job efficiently	A project manager should possess time management skills to be efficient.
Differentiating competency	Characteristics required to be considered for the next job	The ability to manage a multi-large project differentiates a project manager from a senior project manager.

Considering these five different categories of competency, our main focus in this research is on professional/functional competency. The objective of this category is to improve performance by possessing the skills required to complete a task successfully and have an impact

on the overall organizational performance (Polite-Wilson, 2013). Organizations have a variety of options to influence professional competencies by applying different methods either independently or combined, as described by Hoheb (2013), the options are:

- ***In-work development*:** by involving employees in more complicated assignments.
- ***Mentoring*:** by developing a specific competency that is possessed by someone in the workforce who has the ability to mentor.
- ***Coaching*:** by developing a specific competency from a different organization.
- ***Course work*:** which is linked to a specific competency that needs to be developed.
- ***Development activities*:** by attending workshops.
- ***Self-study with feedback.***
- ***Internal/external rotations*:** by exchanging assignments to enhance the experience.

Nevertheless, as organizations focus on developing competencies, it is the employee's responsibility to recognize his career and personal development requirements and he should discuss it with his management chain. The management's responsibility is to allocate a development plan and to bring the organization up to the requirements needed for better performance. Thus, management and employees should have developmental conversations to align both organizational and employee needs (Polite-Wilson, 2013).

Competencies and Organizational Performance

One of the major objectives in complex organizations is to focus on performance management as a strategic plan to achieve organizational goals and top management satisfaction. With the rapid changes in requirements, organizations should adapt to a positive, active and dynamic role by promoting competency to enhance performance and efficiency, as well as to adapt to future changes to accomplish organizational activities. Therefore, in terms of competency, the competency promotion of employees affects the organization's performance positively (Hsiao, 2012). In fact, organizations investing heavily in developing employees' competencies through training are considered developing organizations (Vveinhardt, J., & Stonkute, 2015). Individual performance, as well as the performance and success of an organization, is dependent on individual competencies (Kolibácová, 2014). As concluded by Payne (2005), a three-component model of competence was implemented in an organizational context and included skills, knowledge, and motivation. It was found that competency had a favorable impact on both job and organizational performance.

To understand the meaning of complex organization, Adamsson (2007), has defined complexity as the uncertainties and difficulties brought about by the different functions, components and technologies that an individual and organizations are facing and operating. Furthermore, many manufactured and operated products are becoming increasingly multi-technological, resulting in increased complexity in terms of technologies, the number of components, interfaces and dependencies. Therefore, it is important to highlight that this problem has ramifications for numerous stages of a product's life cycle (e.g. engineering and maintenance). As such, there is a positive relationship between the complexity of products and the complexity involved in managing multi-disciplinary organizations, that is if one increases,

the other increases as well. Accordingly, modern aircraft are without a doubt one of the most complicated industries from a technological and organizational level.

Aircraft Engineering and Maintenance Organizations

Aircraft engineering and maintenance are indeed among the direct operational and fundamental operations of air transportation, which is today's most efficient, effective, and sustainable mode of transportation (Gunes, Turhan and Acikel, 2020). The digital era, including its disruptive technology, has presented additional challenges to aircraft engineering and maintenance activities. As such, it is important to improve one's competence, knowledge and attitude. The surge of new generation aircraft requiring depot-level services necessitates an efficient set of skills to encompass unit operations, strategy, and the environment (Moin et al., 2019). According to McDonald et al. (2000), aircraft engineering and maintenance activities have a highly regulated and dynamic environment, with interdependent and complex systems and technologies, thorough and formalized task procedures and documentation. In addition, accident rates are widely disclosed, and management systems are strictly monitored to guarantee consistency, efficiency, and safety at all times. On a technological level, the increase in the number of highly integrated functions and components that heavily rely on digital electronics and distributed software have significantly contributed to the rise in complexity (Delicado, Salado and Mompó, 2018).

With regard to aircraft accidents, the human factor plays a crucial role in these mishaps. Extensive investigation of previous aircraft accidents has revealed that they were not merely the result of direct technical failure or erroneous operator actions, but organizational and management issues were at the base of the problem. As such, the accident at Gottrora in 1991

and the Daventry incident in 1995, for example, have emphasized the crucial relevance of internal communication, implementation, decision-making, and assessment procedures (McDonald *et al.*, 2000). In comparison to aircraft and flight-related systems, humans have a significant influence on aviation accidents and crashes. According to Batuwangala, Silva and Wild (2018), in the early days of aviation, technological failures were primarily to blame for accidents; however, as technology improved and more dependable systems were created, the attention of safety experts began to move in the 1990s to the importance of human factors as contributing causes to accidents. In reality, human error continues to account for the majority of accident-causing factors, contributing around 70% of the time. This emphasizes the importance of including proper human factors training as a crucial part of contemporary safety management systems. Human factors have an impact on aviation safety throughout the life cycle of an aircraft or system, from design through disposal. Therefore, human resources must perform well in order to conduct aviation operations safely and effectively (Gunes, Turhan and Acikel, 2020).

As far as Air Force is concerned, military accidents arise primarily due to the role and operating environment. In comparison, military aircraft frequently fly severe flight profiles while civilian airplanes often fly simple. Thus, an Airworthiness Authority within the military organization is responsible for being the body of safety for all state-owned and operated aircraft. Accordingly, to guarantee that every interface with the aircraft systems is appropriately viewed to ensure safety, airworthiness management systems are underpinned by specific regulations and standards. Nevertheless, in military environments, the commanders must have access to a risk-based assessment. Airworthiness risks may be accepted by the operators when flying the aircraft is necessary for operational reasons. This is different from civil aviation, where it is never acceptable to fly an aircraft that isn't airworthy (Purton and Kourousis, 2014).

T-shape Competency Model

An interesting study by Delicado, Salado and Mompó (2018), aimed to assess the inefficiencies in collaborations between engineers working in the aircraft industry (Airbus) and to capture the effectiveness of competencies towards the organization's performance. A model was created to demonstrate what gaps can be identified in the organization as well as to address the current organizational and technological challenges in this field. The T-shape competency model was developed around engineers with a sufficient amount of experience in a single or multiple technical areas (depth) as well as a wide range of practical and specialized knowledge in multiple areas (breadth). The main categories of the T-shape model consist of horizontal strokes that are built with transverse competencies upon those mentioned in the vertical stroke as shown in Table 2. It is characterized by three major layers, each layer is built incrementally upon the competencies in the layers below. Some competencies will probably be general, others might qualify and resemble the organization or one of its layers, and some, given their combination, might be unique to a specific role or task.

Table 2 T-shape competency model (Delicado, Salado and Mompó, 2018)

HORIZONTAL STROKE OF THE "T" – Layer 3 **Interdisciplinary team-based cognitive and social cooperation** (At System Level)
1. Able to influence and trust others. 2. Able to communicate clearly ideas and problems and foster open two-way discussions and views. 3. Able to communicate vision and technical steps needed to reach implementation. 4. Able to think critically on their own work and teamwork done. 5. Able to listen efficiently and translate this information to others . 6. Able to understand and manage change. 7. Able to understand what their work means within the organization. 8. Awareness of the importance of the professional honesty and integrity. 9. Able to work within a team.
HORIZONTAL STROKE OF THE "T" – Layer 2 **Interdisciplinary cooperation** (At System Level)
10. Able to see systems to understand problems at system level (systems thinking). 11. Able to understand technical planning, monitoring and controlling. 12. Able to understand interface management. 13. Able to define and manage requirements (within their core expert domain). 14. Able to understand risk management . 15. Able to define the strategy of integration and verification (within their core expert domain). 16. Able to understand a systems architecting process. 17. Able to understand a project management framework.
HORIZONTAL STROKE OF THE "T" – Layer 1 **Multidisciplinary Cooperation** (At Technology Level)
18. Able to understand the systems integration process . 19. Able to understand validation and verification process in the whole life cycle . 20. Able to understand safety and fault analysis. 21. Able to understand regulatory frameworks , airworthiness and aircraft certification process.

VERTICAL STROKE OF THE "T" **Working knowledge of adjacent disciplines**
22. Knowledge of aerodynamics and aircraft anatomy . 23. Knowledge of electronics and digital data buses. 24. Knowledge of instruments and sensors. 25. Knowledge of electromagnetic hardening (EMI-EMC and Lightning Strike).
Participation and direct involvement in activities within areas from different domains and multidiciplinary projects.
Academic foundation in one field of engineering .

The vertical stroke of this model is related to the basic working knowledge and engineering awareness which lists the engineering disciplines and the primary area of specialization. Here, the vertical stroke acts as a foundation to all competencies above, as captured earlier in this chapter that a set of competencies are dependent on the foundation of

competency but are necessary for determining the capability and qualification of performing a task for a specific role (Polite-Wilson, 2013). The first layer of the horizontal strokes highlights the competencies that are associated with management processes and regulatory practices which covers the most tangible, basic and actionable means. As can be seen in the first layer of the horizontal strokes, where competencies are mostly technical, the second layer includes competencies that are more strategically focused and relate to management, control, visualization, and planning. In essence, it serves as a link between engineering disciplines and a system-level perspective. Competencies related to behavior, leadership and basic skills for interacting and communicating with other employees are included in the third and final horizontal layer. These competencies are considered crucial since they enable knowledge transfer among employees and the ability to learn from mentors and experts.

Although this model was mainly aimed at identifying insufficient collaboration in engineering, it is still useful for this study as a guide to capturing some of the most important competencies that are needed to work in this field. As far as this research is concerned, it is ideal to examine competencies that are related to every stroke at both DoAE and AES. However, as stated previously on the carlton advanced management institute competency category, our attention is towards professional/functional competencies. As such, by looking at the T-shape model, we find that competencies composed in the vertical layer and in the first and second horizontal layers are our area of concern. Therefore, competencies composed in the third horizontal layer which mostly describes work ethics are excluded from this research.

III. Methodology

Chapter Overview

First, to give a simple definition of research methodology and research methods, research methodology can be defined as a well-structured systematic technique used in solving problems, whilst research methods include the specific tools and procedures applied to conduct the research (Kothari, 2011). This chapter will describe and justify the methodology and research methods chosen for this study, provide a discussion on the development of the research instruments, and then explains the data collection and analysis methods applied to obtain the results.

Quantitative Methodology

The quantitative methodology, which aims to relate numerical values to observations in order to grasp specific study phenomena, is considered one of the most often used methodologies in research studies. As such, a quantitative technique is applicable to a wide range of study topics, provided that the author has the appropriate abilities and skills to convert abstract concepts into statistical values in order to provide the basis for further quantitative analysis (Yauch and Steudel, 2003). The quantitative technique generally results in large data, which might be numerical or categorical, and the data may then be evaluated using a variety of data analysis methods to understand much more about the sample's attributes or to see how secondary data might help answer a specific research question. In almost every situation, the quantitative methodology allows the researcher to determine if the link between factors is statistically meaningful and whether the sample findings can be extended to the whole population (Treiman, 2014).

According to Choy (2014), The fundamental benefit of such methodology is its flexibility, dependability, and a high degree of openness, which is supported by statistical analysis in order to explain research results. That is to say, all of the claims stated in quantitative research are based on objective statistical analysis, which almost removes biases that may occur in other approaches. Despite the quantitative methodology's remarkable accuracy and practicality, it is unrealistic to expect that all factors affecting a study topic can be adequately described in mathematical terms without oversimplifying complicated social phenomena. In addition to these challenges, producing statistically significant and hence representative results often necessitates enormous resources and deep expertise in data collecting and processing procedures, both of which are not always generally accessible to researchers.

Qualitative Methodology

Qualitative studies tend to entirely investigate a phenomenon to offer implications and findings. Notably, qualitative approaches do not separate the context from the study itself, as the contextual environment is examined and interpreted carefully before making a conclusion. Thus, qualitative methodology is mostly applied to educational research when exploring a certain topic, and in most cases, the topic being examined does not have significant historical data (Walker, 1987). Additionally, qualitative research involves understanding, exploring, interpreting, and clarifying people's experiences, attitudes, values, beliefs, and perceptions (Ranjit, 2011).

Choy (2014), explained that people in favor of the qualitative approach argue that the sophistication of the social context should not be limited to numbers since values and beliefs are difficult to be analyzed with quantitative methodology without having to sacrifice the meaning of the study. To illustrate, if research participants in the quantitative study are limited to a list of

prepared answers, the results might not correlate with respondents' feelings and beliefs, which are all significant components in understanding human behavior. As a result, qualitative research is capable of providing the flexibility needed to adequately investigate complicated subjects. The author further explains that despite the qualitative methodology's suitability for assessing complicated research issues, collecting qualitative data takes time, and there's a good chance that researchers may overlook important factors that might otherwise explain the findings.

Mixed Methodology

As concluded above, both quantitative and qualitative approaches have certain limitations; thus, even if the researcher supports the use of either methodology, validity and reliability concerns are inevitable when using a specific research design (Saunders, M., Lewis, P., & Thornhill, 2016). Nevertheless, combining qualitative and quantitative approaches is possible without jeopardizing the scientific objective of undertaking a systematic and thorough investigation in order to produce descriptive theories (McCusker and Gunaydin, 2015). The mixed methodology has a number of practical benefits in this scenario one of which is the ability to triangulate. Researchers may use triangulation to combine various approaches to better understand a phenomenon (In this scenario, combining qualitative and quantitative approaches to compensate for one approach's limitations with the strength of another). For example, a statistical study based on a sample group tells researchers about the sample's patterns and trends. Nonetheless, concentrating on causal relationships between variables in the statistical analysis may lead to results that are inadequate to offer in-depth interpretations of the outcome of interest. However, re-examining the discrepancies in the quantitative data set using qualitative

methodology may lead to a deeper understanding of the research problem, which is a strong case for investigating a complex phenomenon (Neuman, W. L., and Robson, 2014).

Saunders, M., Lewis, P., & Thornhill (2016), explained that putting the theoretical advantages of a well-executed mixed methodology into practice is frequently challenging. Therefore, the proper integration of quantitative and qualitative data is primarily based on researchers' abilities and available resources to interpret the results and develop accurate conclusions mutually supported by both quantitative (e.g., questionnaire) and qualitative data (e.g., interviews).

Justification for Choosing Mixed Methodology

Referring to the T-shape model that was captured in the previous chapter, the aim is to examine the existence of such competencies (after the refinement of the T-shape model to reflect the actual practice of the organization) directly from the employees themselves. Although such phenomena are exploratory in nature, the researcher wants to capture the employees' beliefs and perceptions to be able to answer the research questions. As such, it is assumed that achieving this would be difficult using a qualitative approach only since the population chosen for this research is expected to be more than 100. Fortunately, using a mixed method would allow the researcher to generalize the results to a population and build a detailed view of the meaning of the phenomena by collecting quantitative and qualitative data. Additionally, the qualitative method may provide a deeper understanding of a particular study since narratives can help the researcher comprehend the phenomenon, whilst the quantitative approach strategy may broaden the study by enabling the researcher to collect data from many people on various topics. As a result, a

mixed technique creates a better view and allows for more perceptions that are thought to be useful to the study. (Dawadi, Shrestha and Giri, 2021).

Research Methods and Techniques

As aforementioned, the researcher will use the mixed methodology to gather data in order to achieve the research objectives. As such, the quantitative data collection will rely on a survey using closed-ended questions, while qualitative data collection will rely on a single interview with a management representative of the organization using open-ended questions. The researcher's aim is to strengthen the research by developing numerical data and textual information to be able to develop a refined and effective conclusion. The following sections will describe and explain the instruments used to collect the data.

Survey

A survey is a data gathering approach that consists of a series of questions that participants must interpret and choose the best option that perfectly represents their opinions. In comparison with a qualitative structured interview, a quantitative survey does not allow participants to give a response that differs from the one provided by the questionnaire developer. Additionally, Due to the comparatively low cost and simplicity of such a method, researchers with limited resources (e.g. time) should consider survey as one of the key data gathering methods available. Because the survey may be completed without the researcher's presence, the data collecting procedure is frequently quicker and less expensive than other approaches (e.g. interview) that need the researcher to contact study participants personally (Ranjit, 2011). All in

all, the researcher will apply the survey as a means of collecting data from participants working in the organization.

Interviews

According to Saunders, M., Lewis, P., & Thornhill (2016), the interview method is a tool that is mostly applied in qualitative research, as it discovers the respondent's perspective without any constraints that are normally encountered using other qualitative tools. Additionally, interviews are the most appropriate tool for complex areas that need more explanation (Ranjit, 2011). There are three basic types of interviews offered for the researcher to utilize the most suitable one: structured, semi-structured and unstructured in-depth interviews, each providing the researcher with a different level of control. Structured interviews are similar to questionnaires in many ways, except that respondents are not given a choice of replies where the discussion remains open-ended. Structured interviews, however, provide a chance to gather quantitative data, which may be especially useful in mixed methodology or when there isn't enough time to process or incorporate unstructured qualitative material. On the other hand, researchers and respondents have greater flexibility when using semi-structured and unstructured interviews to get meaningful information and express their views. (Saunders, M., Lewis, P., & Thornhill, 2016). As far as this research is concerned, and due to time constraints, the researcher will rely on a single semi-structured interview with one of the higher management in the organization to help provide the researcher with more information regarding competency management.

Development of Research Instruments

As previously indicated, we've established that an online survey and interview are the appropriate tools for this research; nevertheless, the focus in this section is on developing the questions. The research objectives, which have defined the study's baseline and the direction for finding the research phenomena, are the main contributor to the development of the research instruments. The researcher used a multi-step technique to achieve this, which included looking for the best literature in the field using journals, e-books, and online search engines. The researcher utilized the aforementioned T-shape model as a guide to developing the survey questions after reviewing the relevant literature. The researcher then revised and reconstructed the model based on actual tasks and activities practiced by the organization, since the model was originally designed for a manufacturing company (Airbus) rather than an operating organization (RSAF). The recreated model for this study is as follows:

Table 3 Reconstructed T-shape Competency model

Horizontal stroke – Layer 2 (Competencies at system level)
1. Able to understand problems at a system level 2. Able to understand systems interface 3. Able to define and manage task requirements 4. Able to understand risk and safety management 5. Able to define the strategy of tasks' implementation and verification 6. Able to understand the project framework
Horizontal stroke – Layer 1 (Competencies at regulatory level)
7. Able to understand the engineering change process 8. Able to understand the requirements' validation and verification process 9. Able to understand safety regulation 10. Able to understand airworthiness, and aircraft certification process

Vertical stroke (Basic and working knowledge)
11. Knowledge of aerospace engineering 12. Knowledge of avionics engineering 13. Knowledge of mechanical engineering 14. Knowledge of electrical engineering 15. Knowledge of software engineering 16. Knowledge of industrial engineering

Based on the refined model above, the researcher was able to develop the research instruments which were revised with the assistance of the supervisor to guarantee their validity. Copies of the online survey and interview questions are attached in Appendix A and Appendix B respectively.

Choice of Samples

As stated in the study's scope, the goal of this research was to choose respondents who are working in both DoAE and AES. A variety of selections in engineering specialties was considered to include all aspects of the organization. In addition, the selection included a management representative in the organization for the proposed interview, a position that can discuss the current competency management system and the future strategies of the organization. The qualification and experience of the participants were greatly considered, because the more qualification and experience they have, the more valid their views are.

Data Collection and Analysis

Due to travel and time constraints, the researcher chose the online data gathering method for both the survey and the interview. Participants in the survey may complete it by entering their responses online with the highest level of convenience. The replies are then automatically saved in a database, allowing for easier data management. Accordingly, the online interview is more convenient, flexible and efficient and the costs associated with face-to-face interviews are mostly eliminated. Finally, the interview is recorded as it enables the researcher to conduct a thorough study and examination of the interview.

IV. Results and analysis

Chapter Overview

This chapter will present the data gathered from both the survey and interview. The interview results are first presented and analyzed to provide a basic understanding of the existing issues as well as the approach to competency management and future strategy. The survey results are then thoroughly examined and discussed.

Interview Analysis

Competency management and future strategy

As stated in the previous chapter, the purpose of the interview is to understand the current competency management system and the future strategy for the organization as well as to assist in clarifying the survey data analysis. As such, the researcher's objective was to determine if a competency framework is used in DoAE and AES and to learn more about the organization's approach to competency management. The respondent acknowledged the existence of a competency framework and clarified that performance evaluations for each employee are used to assess every employee's performance at the end of each year. This evaluation report contains some recommendations regarding whether the employee is highly competent, needs further training, or cannot do the responsibilities assigned to him. Unfortunately, these recommendations are not often applied as required to ensure the proper training was provided. As far as future strategy is concerned, the organization is simply aiming to establish a training plan and learning path for every employee.

Methods of developing competencies

The methods of developing competencies were also an area of concern to the researcher. The management highly values the on-job training method by making sure that less experienced employees are shadowing others with more experience like Foreign engineers (Expats) to learn and understand more about the work they do. The experienced employees are sometimes asked to train some individuals on how to perform certain tasks and review their work before submission. Moreover, the other method is to enroll employees in various training programs to expand their knowledge and experience. The researcher asked specifically about task rotations since it is one of the important methods to avoid competency degradation. As a result, this method is rarely used in the organization because of the work pressure they experience regularly. Consequently, the employee usually holds onto his position until it is time to be relocated or replaced.

Knowledge and experience

The interview focused on the knowledge and experience of the employees as well as their ability for handling challenging tasks. The answer clarified that while not all employees are capable of performing effectively due to experience gaps, others may pick up information more quickly than anticipated and go on to play important roles in the organization. In addition, the lack of experience was highlighted as the most common issue that stands in the way of completing complicated tasks. The organization is concerned about this issue because the majority of Saudi national engineers employed have little to no experience.

Training and hiring process

It was noted that most of the time, the hiring process makes sure that each role's essential competencies are highlighted. However, there are situations when the organization must hire

someone who just fits most but not all of the requirements because jobs must be filled promptly. As per the training opportunities offered by the organization, the respondent explained that even with the absence of a strong training plan that tracks employee development, they believe the training programs they offer can be adequate enough for employees to satisfy the responsibilities assigned to them.

Survey Data Analysis

The respondents' background and experience

With regard to the survey questions, the researcher was able to collect a total of 46 responses. The finding reflects the fact that the majority of the employees in the organization are civilian engineers with 67.4%, and 32.6% are military engineers as seen in figure 1 below.

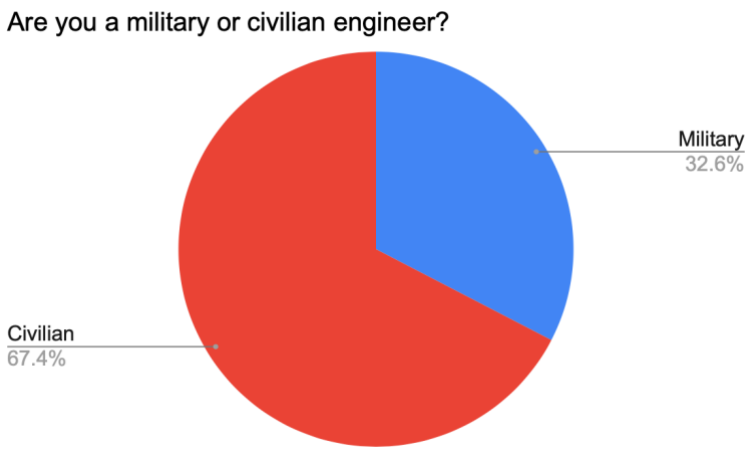

Figure 1 Proportion of military and civilian engineers

The survey included a question about years of experience since it is crucial for employees to have in order to execute tasks efficiently. Figure 2 shows different levels of experience, with the majority of the respondents being above 25 years of experience (23.9%). Nevertheless,

17.4% of the respondents are below 5 years of experience, indicating that some employees are still in the job training phase.

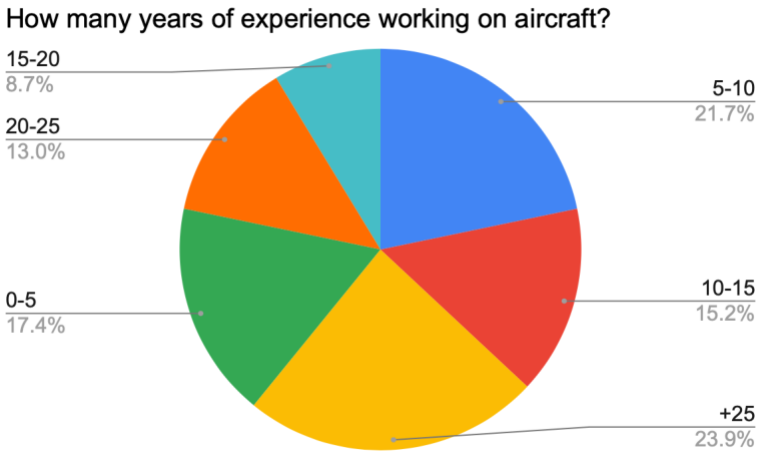

Figure 2 Years of experience

Given that civilians make up the majority of the organization's employees, the researcher was specific about their years of experience working for RSAF. We can observe from Figure 3 that just 2.2% of the civilian respondents have experience of more than 25 years and 6.5% have experience of between 20 and 25 years with RSAF. Most of the responses are for civilians with 5-10 years of experience (30.4%) and 0-5 years of experience (19.6%). This finding doesn't necessarily imply that most civilian engineers lack experience; instead, it suggests that they may have had jobs with similar organizations such as US Air Force, the Royal Air Force, or companies that had long-term contracts with military organizations. Because the working environments and backgrounds of such organizations are comparable, their employees may be qualified to fill different positions in other organizations.

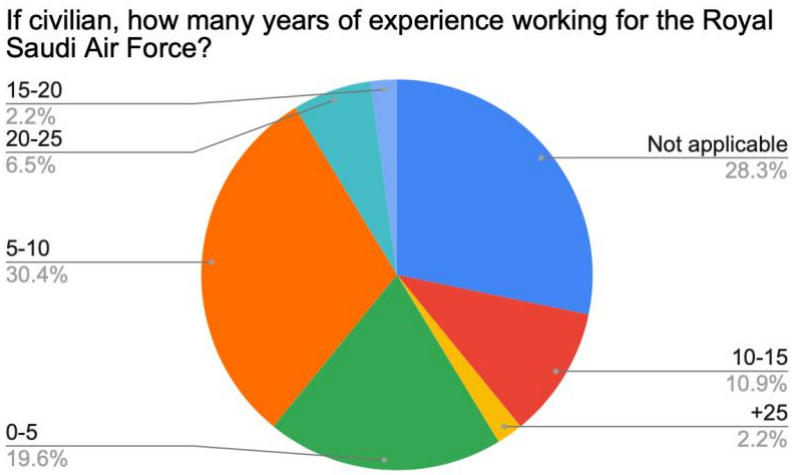

Figure 3 Years of experience of civilians working for RSAF

The survey also included an important question about the respondent's area of expertise. The aim is to highlight the basic working knowledge and engineering awareness which lists the engineering disciplines and the primary area of specialization as described in the T-shape model. the finding in Figure 4 indicate that the majority of respondents have the necessary background and knowledge needed to work in the aeronautical engineering department and squadrons.

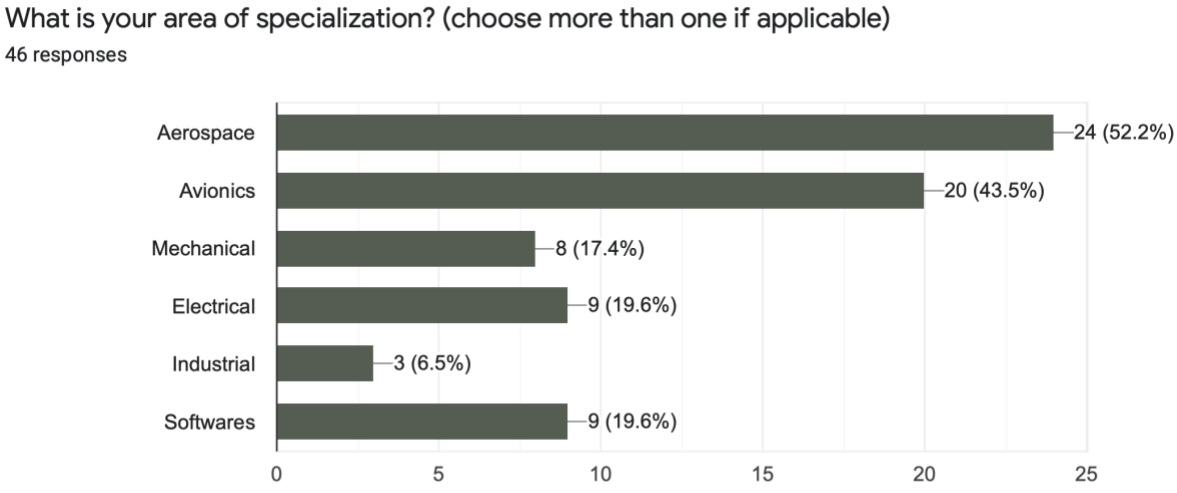

Figure 4 Area of specialization

In addition to the area of expertise, the researcher was also interested in the education level to get a sense of the educational opportunities offered to the employees. Figure 5 highlights the respondents' different academic backgrounds with 4.3% holding a Ph.D. degree, 21.7% holding a Master's degree and 73.9% holding a Bachelor's degree. It is clear that only a few employees are holding higher educational degrees which are essential to improving professional/functional competencies. Critical organizations such as the aeronautical engineering department and squadrons require an advanced level of knowledge in order to qualify the decisions that are made as stated in Chapter 2 that the goal of professional competencies is to promote better performance by having the necessary skills to execute a task effectively and influence the overall organizational performance.

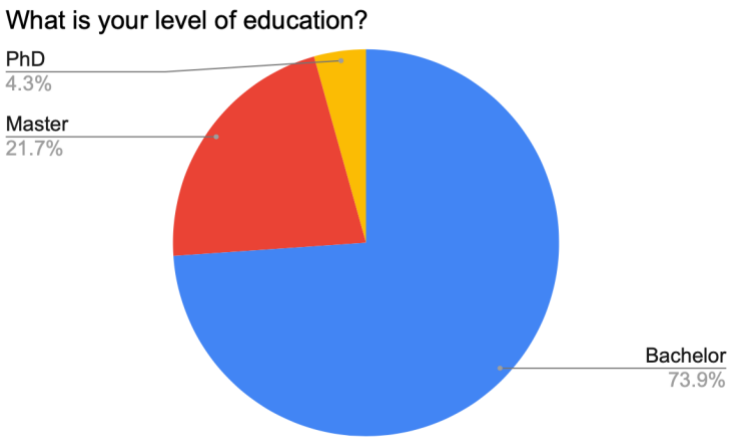

Figure 5 Level of education

Competencies at the regulatory level

The first question related to competencies at the regulatory level focused on the most common process used in the organization which is the engineering change process. This process is used for the purpose of clearing and qualifying repairs and modifications before being installed

or used on aircraft. Therefore, Figure 6 shows the participants' response to the ability to understand the process where the majority have chosen "strongly agreed" and "agreed" with percentages of 37% each. 19.6% of the participants chose neutral, and the remaining chose "disagree" and "strongly disagree" with 4.3% and 2.2% respectively. The results indicate that few employees are either confused or not able to understand the process. Owing to the fact that some employees have insufficient experience working on aircraft, they may find the process to be complicated and difficult to understand.

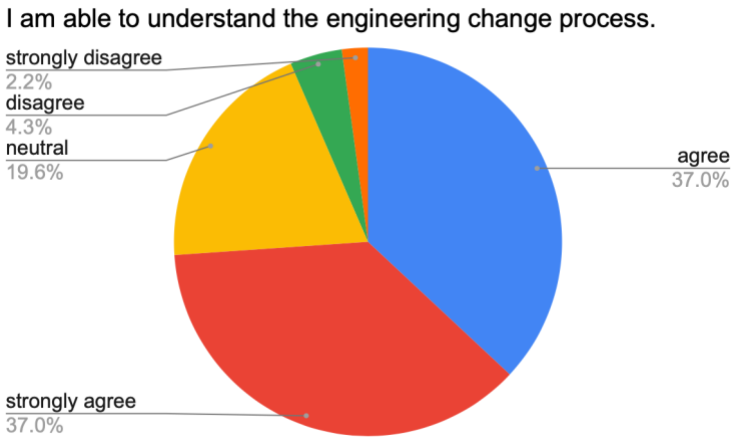

Figure 6 Ability to understand the engineering change process

Next, participants were asked about their ability to understand the requirements' validation and verification process. This is important since a process like this decides whether or not the capabilities meant to be implemented in the platform are accurate and in accordance with the requirements. As shown in Figure 7, 39.1% strongly agree and 30.4% agree with the statement that they are able to understand the process. Similar to the previous question, some employees were unsure of whether they comprehended the process (19.6%), and the remaining disagree and strongly disagree with the statement with 6.5% and 4.3% respectively. We can

argue that lack of experience and knowledge may be the cause of any disagreement with this statement.

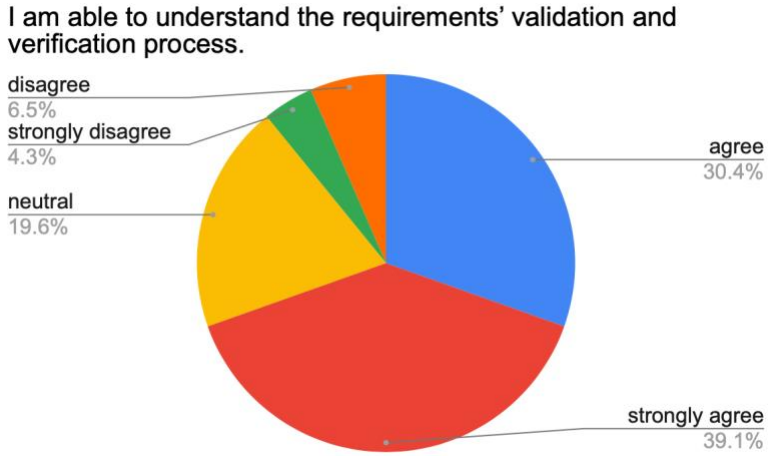

Figure 7 Ability to understand the requirements' validation and verification process

The following question also addressed one of the key procedures, which is to ensure that all tasks and activities correspond to the aircraft's safety regulations. As a result, Figure 8 demonstrates that around 89% of the respondents are confident and able to understand the regulations. Nonetheless, 4.3% are uncertain about the ability to understand it, while the rest disagree with 2.2% and strongly disagree with 4.3%. It can be concluded that these procedures require more practice and awareness of the safety regulation which is part of being experienced and trained in the field.

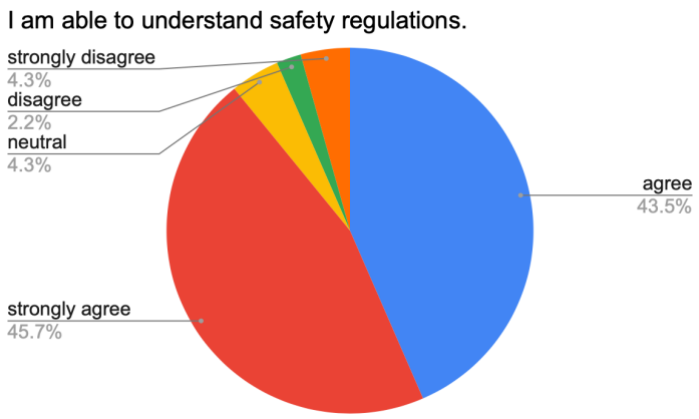

Figure 8 Ability to understand safety regulations

The researcher also inquired about the final process followed before approving any upcoming engineering modifications or capabilities. The airworthiness and aircraft certification process is considered to be the backbone of the organization since it issues a certificate to the platform which attests that the aircraft is airworthy insofar after the changes are implemented and it conforms to its type design. That being said, figure 9 shows that 17.4% of the respondents have doubts about their ability to understand the process, 8.7% disagree and 4.3% strongly disagree with the statement, while the remaining respondents, approximately 70%, are able to understand it. According to this, around a third of all respondents are either not in control of the process or are unable to complete tasks that require airworthiness certification.

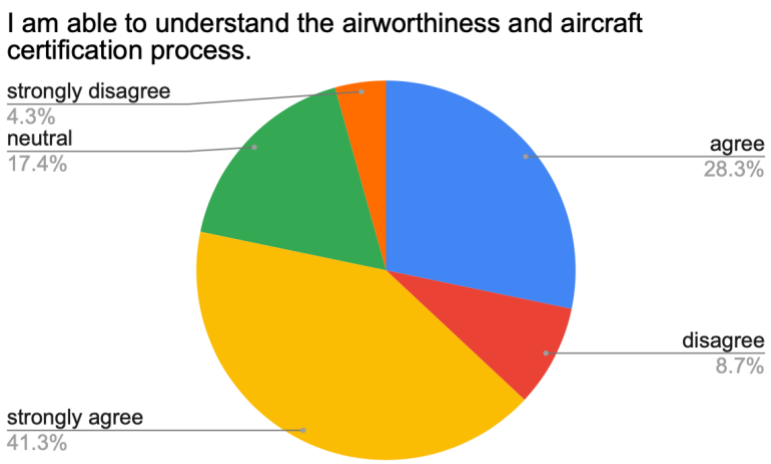

Figure 9 Ability to understand the airworthiness and aircraft certification process

Competencies at the system level

The following questions are based on competencies that enable for understanding and managing issues related to aircraft systems. The researcher started by asking about the ability to understand issues at a system level. According to figure 10, 30.4% of respondents strongly agree with the statement, and 43.5% agree. On the other hand, the findings demonstrate that 17.4% of respondents are neutral, while the remaining respondents disagree with the statement (8.7%). The outcome shows that some employees have trouble understanding the problem, which is the first step in coming up with a solution.

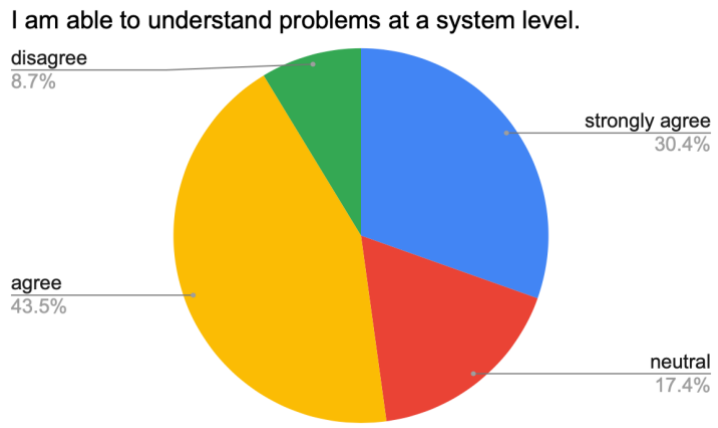

Figure 10 Ability to understand problems at a system level

In order to ensure that other systems are not impacted by any modifications or implementations, participants were also asked about their ability to understand how systems are interfacing. According to the results in figure 11, around 74% of respondents are confident with the statement, while 15.2% are doubtful and 10.9 have difficulty understanding it. This outcome is almost identical to the previous one, which was that certain employees could be unable to provide a suitable solution owing to a knowledge gap.

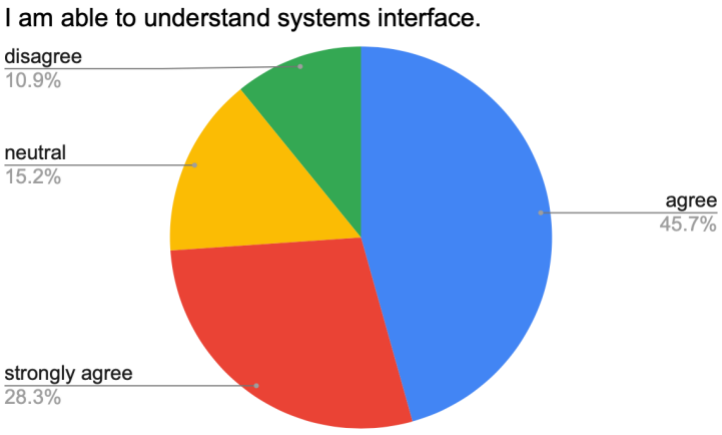

Figure 11 Ability to understand systems interface

The next question is about defining and managing task requirements, which lay out the elements of the solution and how they will be incorporated. They also help in defining the safety argument, which is crucial in practically every situation. Figure 12 shows that nearly 89% of the respondents say they are assertive about it. Yet, 6.5% are unsure, and just a few have difficulties understanding it (4.3%). We can observe that the majority of employees are capable of managing and defining task requirements.

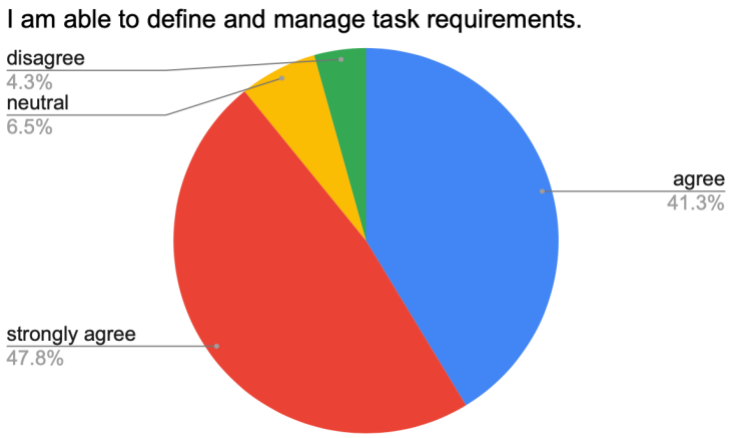

Figure 12 Ability to define and manage task requirements

Risk and safety management is vital because it contributes significantly to the creation and argument of the safety report. In response to this question, the respondents gave different levels of agreement: 34.8% strongly agreed, 43.5% agreed, 17.4% were neutral, and 4.3% disagreed. The result in figure 13 demonstrates that the majority of employees are certain and competent to handle risk-related concerns. However, additional experience is needed in order to negotiate risks and provide a safety argument. As a result, it is considered that a lack of experience is to blame if someone is confused about or incapable of understanding risk and safety management.

Figure 13 Ability to understand risk and safety management

The competence of the respondents to define the methods of task implementation and verification was also addressed. This is significant since each situation requires a different approach to implementing the solution, which must then be checked for validity. As shown in figure 14, 71.8% of the respondents say they have no problems in this area, while 17.4% are doubtful, and 10.9% find it difficult to put it into practice. It is considered again that the uncertainty and disagreement may be indications of inexperience and knowledge gaps.

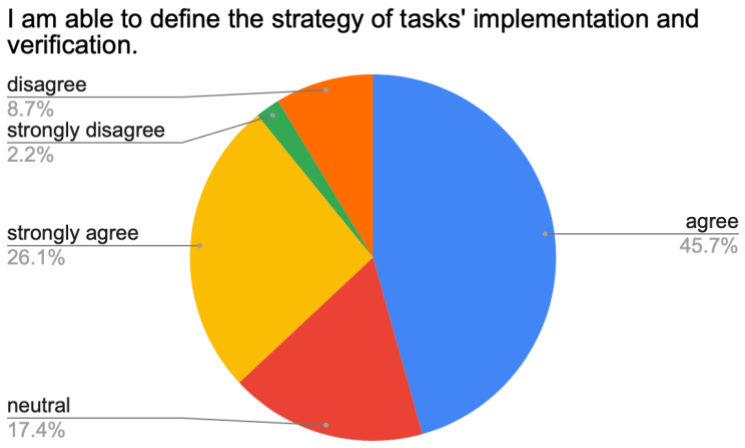

Figure 14 Ability to the strategy of tasks' implementation and verification

The final competency that was inquired about is the ability to understand the project framework from the beginning to the end. It is considered to be the complete knowledge of all activities involved in most projects. The majority of the respondents strongly agree with 43.5%, and 34.8% agree with the statement. Additionally, 10.9% chose neutral, 8.7% disagree and only 2.2% strongly disagree as presented in figure 15 below. We may notice that certain employees need additional guidance to complete a project or a mentor to help them and validate their work.

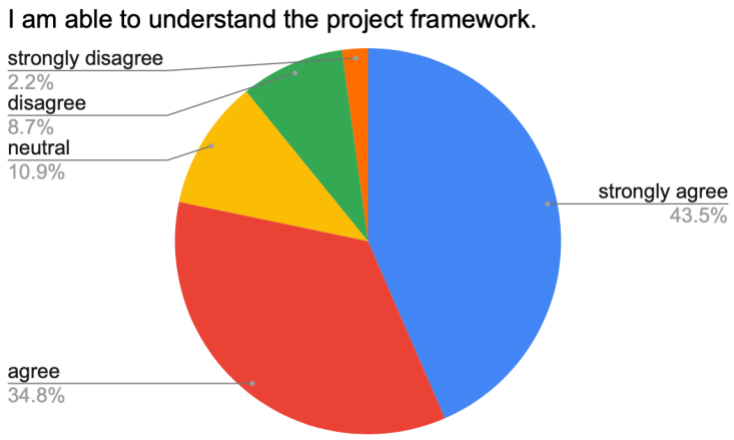

Figure 15 Ability to understand the project framework

Finally, it was crucial for the researcher to inquire about training opportunities and knowledge gained inside the organization to examine the development of employees' competencies. Figure 16 shows that 58.7% of respondents are satisfied with the training they received and feel prepared to carry out daily activities. Furthermore, 30.4% are unsure of how adequate the training is, and 10.9% are dissatisfied and feel they still lack the necessary knowledge.

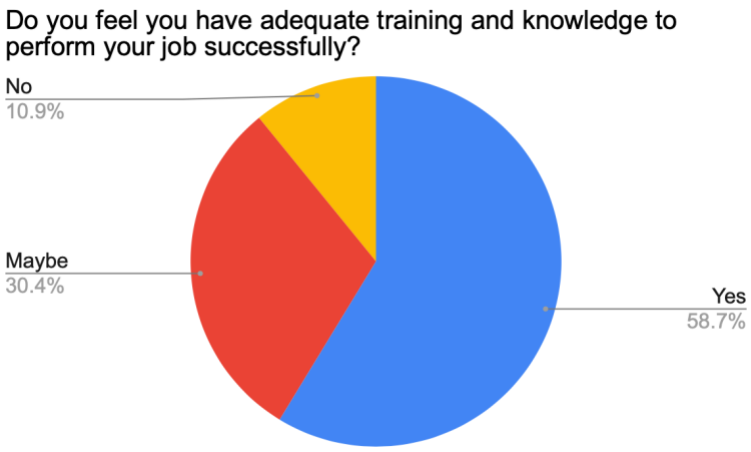

Figure 16 Adequacy of training and knowledge to perform job successfully

V. Conclusion and Recommendations

Chapter Overview

This chapter will begin with a review of the most essential findings from the data analysis. There will then be some managerial implications that could be useful to improve organizational performance. The researcher will next discuss the significance of this research before concluding with recommendations for future study.

Review of Findings

The interview and survey findings both emphasize the absence of experience as the first and most crucial finding. The management claims that engineers with more experience can handle most of the challenging tasks with ease. However, engineers with less experience, who constitute the majority in the organization, struggle to do those jobs on their own. Since the attention is on experienced employees to complete the tasks either directly or by mentoring others to ensure job accomplishment, this might impair overall performance due to the daily work pressure they are experiencing. Another significant finding is related to the competency management system, where recommendations in the annual evaluation reports are not carefully considered to guarantee appropriate training is being provided, which may have a detrimental effect on the development of the individual. This annual report makes clear if the employee's performance is satisfactory or still requires improvement. The employee would remain at the same level the next year if the recommendations were disregarded.

Additionally, job rotation is not being appropriately utilized in the organization owing to work pressure, despite it being one of the key strategies to prevent competency degradation. Accordingly, to maintain performance continuity, the engineer is required to remain in his

position without changing jobs. Another intriguing finding relates to the hiring process, where positions must be filled quickly due to workload. The organization is compelled to employ engineers who mostly, but not entirely, match the requirements. As a result, further training would be necessary for the engineer to cover that gap. As far as training is concerned, The findings indicate that some engineers are not completely satisfied with the training opportunities offered by the organization. The management makes an attempt to select courses that are as appropriate as possible. However, it could be challenging to monitor the progress of every employee because there isn't a training plan/learning path set up for every individual.

Managerial Implications

One of the main objectives of this study is to provide recommendations that might enhance competency management and, ultimately, organizational performance. The following recommendations are made in light of the findings:

1. **Training:** Creating a training plan for each individual may assist track their performance and assure their future advancement within the organization. The training plan can be explained as a set of courses and assignments that would potentially improve the employee's knowledge and experience. A plan like this can outline the employee's current situation, what is necessary to occupy certain jobs, and how long it takes to achieve it.

2. **Online short courses:** The idea of establishing online short courses can help in improving employees' awareness. The content of these courses can be about standards, processes and procedures that the organization is using. This is important for new

employees to aid in understanding some of the regulations that most of the work depends upon.

3. **Annual reports recommendations:** The annual reports are a useful tool for evaluating employee performance. Actually, it highlights the performance level and any concerns that still need to be addressed. To achieve a performance improvement, attention must be taken to assessing and implementing the recommendations.

4. **The hiring requirements:** When employing new personnel, the management in this case needs to make sure that the minimum requirements are satisfied. While certain qualifications are necessary for the job, some are flexible and may be learned through on-the-job training. The time spent on employee development can thus be reduced and instead utilized for learning alternative skills.

5. **Job rotation:** As stated previously, job rotation is a key strategy to enhance employees' experience. This could just involve a temporary assignment completed occasionally rather than a total change in job duties. Such an approach will assist in gaining the basic understanding needed for the various jobs inside the organization, which will eventually help in increasing productivity and innovation.

Significance of The Study

Aircraft engineering activities are a crucial stage in ensuring safe and effective flight operations. Taking into consideration the challenging tasks of the aeronautical engineering directorate and squadrons, it is important to improve employees' competencies to achieve optimal performance. This study rebuilt a competency model that was formerly utilized to assess

employees' competencies and offered recommendations for competency management to improve organizational performance.

Recommendations for Future Research

It can be suggested that a future study examine the competency framework currently in use within the organization. The aim is to determine whether it emphasizes and evaluates all essential competencies captured in the rebuilt competency model that this study has presented or if additional work needs to be done to make it more effective.

Appendix A

Q1: Are you a military or civilian engineer?

☐Military

☐Civilian

Q2: How many years of experience working on aircrafts?

☐0 – 5

☐5 – 10

☐10 – 15

☐15 – 20

☐20 – 25

☐+25

Q3: If civilian, how many years of experience working for RSAF?

☐0 – 5

☐5 – 10

☐10 – 15

☐15 – 20

☐20 – 25

☐+25

Q4: What is your area of specialization? (choose more than one if applicable)

☐Aerospace

☐Avionics

☐Mechanics

☐Electrics

☐Software

☐Industrial

☐Other

Q5: What is your level of education?

☐Bachelor

☐Master

☐PhD

For the following questions, choose the appropriate answer from 1 to 5, with 1 being strongly disagree, 2 being disagree, 3 being neutral, 4 being agree, and 5 being strongly agree.

Q6: I am able to understand the engineering change process.

☐1 ☐2 ☐3 ☐4 ☐5

Q7: I am able to understand the requirements' validation and verification process.

☐1 ☐2 ☐3 ☐4 ☐5

Q8: I am able to understand safety regulations.

☐1 ☐2 ☐3 ☐4 ☐5

Q9: I am able to understand airworthiness, and aircraft certification process.

☐1 ☐2 ☐3 ☐4 ☐5

Q10: I am able to understand problems at a system level.

☐1 ☐2 ☐3 ☐4 ☐5

Q11: I am able to understand systems interface.

☐1 ☐2 ☐3 ☐4 ☐5

Q12: I am able to define and manage task requirements.

☐1 ☐2 ☐3 ☐4 ☐5

Q13: I am able to understand risk and safety management.

☐1 ☐2 ☐3 ☐4 ☐5

Q14: I am able to define the strategy of tasks' implementation and verification.

☐1 ☐2 ☐3 ☐4 ☐5

Q15: I am able to understand the project framework.

☐1 ☐2 ☐3 ☐4 ☐5

Q16: Do you feel you have adequate training and knowledge to perform your job successfully?

☐Yes

☐No

☐Maybe

Appendix B

Q1: Is there a competency framework implemented in DoAE? If yes, how is it managed?

Response: Yes. It is managed by the end of each year using performance reports for each employee for evaluation. The evaluation score consists of 5 levels; Excellent, Very good, Good, Poor, and Bad. Within this report is some recommendations on whether the employee is highly qualified, needs more training, or cannot handle tasks given to him.

Q2: How do you ensure that the current competency management system is working?

Unfortunately, it needs more improvement. As mentioned earlier that we have performance reports at the end of each year, but sometimes the recommendations are not implemented as required. For example, sometimes when the report states that the employee needs more training, you may expect no action from the hiring company to ensure the proper training was provided.

Q3: What kind of methods are applied to influence employees' professional competencies?

The best way followed is the on-job training. We make sure that less experienced employees are shadowing others with more experience like Foreign engineers (Expats) to learn and understand more about the work we do. The experienced employees are sometimes asked to train some individuals on how to perform certain tasks and review their work before submission. The other way is to send employees on different courses to gain more knowledge.

Q4: How are task rotations being utilized to overcome competency degradation?

This is rarely being used, we don't concentrate on rotating tasks between employees which is one of the weaknesses of this organization. When we assign the employee, and due to the work

pressure we experience regularly, he normally stays in his post for a long time or until moved somewhere else.

Q5: Do you think the level of knowledge and experience existing is sufficient to handle complicated tasks?

Not for all the employees. After a few years of experience, some employees exceed the expectations, while others are behind and still learning.

Q6: What are the most common issues that stand in the way of completing the task?

The main issue is the lack of experience. There are no issues with Expats since it is mandatory for them to have a good experience before being hired, but for Saudi national engineers with little to no experience, and since they are the majority in the directorate, sometimes it's an issue.

Q7: Do you think the hiring process highlights the necessary competencies for every role?

Yes, most of the time. But occasionally, and due to the need of filling positions quickly, we are compelled to hire someone who meets most but not all of the qualifications required.

Q8: Do you think that the training offered to employees is adequate to satisfy the responsibilities assigned to them?

Yes. As a training plan, we try our best to choose courses that are related to our daily activities and can improve employees' competencies and knowledge.

Q9: What is the future strategy for DoAE with regard to competency improvement?

To set up a training plan and learning path for each employee.

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14. ABSTRACT

The effectiveness of tasks performed by the directorate of aeronautical engineering and squadrons in RSAF directly impacts flight safety, which in turn influences the organization either positively or negatively. Therefore, improving engineers' competencies will improve the overall performance of the organization. The study refined and reconstructed a model, namely a T-shape competency model, to assess the engineers' competencies which revealed some management and competency-related deficiencies and concluded with managerial recommendations.

15. SUBJECT TERMS

Competency, Performance, T-shape model, Aircraft Engineering, Engineers

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