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# Public Sector Shared Services and the Lean Methodology: Implications on Military Organizations

Renato Costa <sup>1,2</sup>, Tiago Resende <sup>1</sup>, Alvaro Dias <sup>1,3,\*</sup>, Leandro Pereira <sup>1,2</sup> and José Santos <sup>1</sup>

<sup>1</sup> Department of Marketing, Operation and Management, ISCTE-University Institute of Lisbon, 1649-026 Lisbon, Portugal; renato\_jorge\_costa@iscte-iul.pt (R.C.); Tiagomcr@msn.com (T.R.); leandro.pereira@iscte-iul.pt (L.P.); jose.santos@winning.pt (J.S.)

<sup>2</sup> BRU—Business Research Unit, ISCTE-University Institute of Lisbon, 1649-026 Lisbon, Portugal

<sup>3</sup> School of Economic and Organizational Sciences, Lusophone University of Humanities and Technologies, 1749-024 Lisbon, Portugal

\* Correspondence: alvaro.dias@ulusofona.pt

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**Abstract:** During the economic and financial crisis, private and public organizations were subject to a constant reduction in costs and resources. Public shared service models felt compelled to adopt the Lean methodology with the aim of reducing costs, reducing waste and increasing employee satisfaction with the provision of quality services. Against this background, this article aims to evaluate the impact of the implementation of Shared Services and the inherent benefits of lean management in the Military Store, Contact Center, Post Office and Internal Portal used by the Portuguese Air Force. Using a case study methodology, this study portrays the elimination of waste and the optimization of existing human and financial resources. After the implementation in 2015, it is still possible now to verify that there is some resistance to change, and the fact that we are dealing with a hierarchical organization justifies this disadvantage. The implementation and operation of all services in their entirety allowed the optimization of resources and the simplification of processes, resulting in the elimination of duplicate tasks.

**Keywords:** lean methodology; lean tools; shared services; optimization

## 1. Introduction

According to Radnor and Boaden [1], it is in the phases of economic crisis that organizations focus on making the most of existing resources, adopting methods and strategies that enable waste-free management with constant improvements [2,3]. Although lean management is a well-researched topic due to its importance in cost reduction and customer satisfaction [4], existing research tends to evaluate the staff dimensions, with little attention paid to the user or customer perspective [5]. Furthermore, research has been focused on manufacturing and services firms (c.f. [4,6–8]), with little attention paid to the public sector [9]. This study addresses both gaps by exploring the user perspective of lean management and simultaneously analyzing this issue in a public sector organization, more specifically in a military organization.

During 2015, through the dispatch no. 59/2015 of General CEMFA, the Portuguese Air Force implemented Shared Services in Support across the entire organization, using Lean methodologies. In this way, the Military Store, the Contact-Center, the Post Office and the Portal-Internal/Self-Service were created. Schulman et al. [2] addresses shared services as a service provision aimed at the general satisfaction of customers, generating internal value, creating a self-sustaining system and achieving the objectives for which they were implemented [4,10]. The constant development of the models implemented in the Portuguese Air Force, generating information that allows their continuous

improvement, had the purpose of analyzing the impact of the implementation of Shared Services, determining the inherent benefits for the Air Force and analyzing the impact and benefits of the Lean methodology, as well as the existing continuous improvement. As such, the main objectives of this study are: (i) to assess the impact of the implementation of Shared Services and the inherent benefits in the Military Store, Contact Center, Post Office and Internal Portal. To achieve this objective the following research questions are raised: (Q1). What is the purpose of using the Shared Services? (Q2). What Shared Services models are implemented in the organization? (Q3). What are the benefits of implementing shared services? (ii) to evaluate the continuous improvement existing in the Military Store, Contact Center, Post Office and Internal Portal. This objective leads to the following research questions: (Q4). What are the main reasons that led to the need to implement the Lean methodology? (Q5). How is waste eliminated and continuous improvement applied? (Q6). What Lean tools are implemented that are adding value to an organization?

To respond to these questions, a qualitative study was conducted using case study method. Data was collected using in-depth interviews with the responsible for implementing the lean management project. This data is complemented document analysis and field observation in the four areas covered by shared services: Military Store, Contact Center, Post Office and Internal Portal.

The article is structured as follows. The next section presents the theoretical framework. Section 3 describes the methodology. Section 4 discusses the results in the four areas of analysis and Section 5 presents the conclusions.

## 2. Theoretical Framework

### 2.1. Shared Services

The shared services aim at a semi-autonomous form of management [11] whose main objective is the consolidation of functionalities attending multiple tasks with reduced costs [2], inserted in several business units without any duplication of tasks [7]. Miskon, et al. [12] report that the objectives are relevant at the strategic and organizational level, becoming a sustainable basis for achieving an organization's objectives.

The requirement of employees and the delay in obtaining documents raised the need for implementation, making the administrative sector of the organization much more effective, simple and faster in the execution of tasks [2]. Organizational arrangements made throughout the organization allow the sharing of information, making it more flexible and dynamic with centralized resources that are focused on tasks. The implementation has become an added value for the Portuguese Air Force, making the satisfaction of customers implicit by providing fast access to their needs [8,13]. In the case of the classic model [14], which despite being a model has not been commonly applied to non-profit sectors in the past, the Air Force adopts part of the adjacent concepts, since there is a "motherhouse", known as the Air Force General Staff, which gathers and processes all the information from all the units spread throughout the country, whether at the financial, administrative or even coordinating level.

With the need to be governed from a single location, the models of Dedicated Centers for Shared Services and Co-location are adopted, where a Shared Services center is implemented, where it becomes possible to resolve most of the financial and administrative situations of the military. The merger model ends up being an integral part of this project, in the merger of functions and administrative processes of several units in the General Staff (Military Store, Contact Center and internal portal). This is done through the implementation of Shared Services. These needs reflect the existence of various benefits [2] in terms of cost savings [7,15,16], improvements in cash-flow and productivity gains through simplification of procedures [17].

In governmental organizations, as is commonly the case, there is a transactional coordination of shared services [7] at the same time as there is an increase in the internal organizational value [16] consolidating the existing transactions [2]. All these changes, when properly implemented, mark the existence of motivated teams [7], improving the relations between the organization and

customers and/or suppliers [18] through a unified approach applied by the Merger model [2]. The transformation, facilitated in its adoption, improves the management of knowledge shared throughout the organization [10].

## 2.2. Lean Methodology

Lean management can be defined as management philosophy aiming to identify and eliminate waste through the value stream of a product, extending not only within the organization but also through the entire value chain network [19]. Lean management structures the organization by incorporating four elements: the product development process, supplier management process, customer management process and policy focusing process [20].

After originating in Japan, the Lean concept was implemented in different sectors [21], undergoing several changes in view of the need for continuous improvement, in what we now know as the basic concept that encompasses the success of JIT and Jidoka [22]. Given the need to improve processes and tasks [23,24] that had been in force in the Air Force since the 1990s, combined with the lack of human resources to cope with the completion of missions necessary for the defense of the Portuguese Republic, it was necessary to adopt a methodology can be adapted to any sectorial context while adding value to the organization using it [25].

The activities that do not add value should be immediately eliminated to avoid the wasting of time and resources, and the main adjacent characteristic is that it is a continuous improvement process with a focus on perfection [25]. The armed forces are going through a period of crisis in which waste has to be disposed of every day, and the new processes adapted from Lean are almost obliged to function correctly in order for the mission to be carried out successfully.

The wastes are categorized, by Taiichi Ohno, by the type of damage they cause to the organization; this characterization can be by waste associated with the absence of value (MUDA), which includes frequent excess production, waiting time and excessive processing. The overload of facilities and equipment/human resources, too much pressure and inability to respond to daily situations forced a need to create a reformulation of services. The Portuguese Air Force carried out a total remodeling in relation to its layout and implemented the well-known "5-S's" (with adaptation to the 6 S's) (MURI) facilitating the resolution of problems and adding value to the organization. The existence of variations in processes causes irregularities that are triggered by an excessive workload or by the reduction of available human resources needed to perform a task (MURA) [6].

The use of Lean tools provides the Air Force with benefits associated with correct implementation and functionality in terms of flexibility, customer satisfaction and controlled inventories [26–31]. In 2015, the Portuguese Air Force completed the implementation phase of the Lean tools and began to support their operation through the new methodology. The implementation was based on the use of force field, IPO and Spaghetti diagrams, several process flow, time value and value flow mappings (Rother and Shook, 1999).

Currently, tools are used to maintain success and effective control with maximum waste elimination through the 5-S's and continuous risk assessment [32]. The preparation and daily execution of Kaizen events allows the rapid identification of failures and immediately presents the necessary solution [21]. All the implemented tools are supervised on a daily basis by the defined work team using the PDCA Cycle [6,22], the Standardization of tasks and the Visual Management [22,33]. Control is carried out by observing the information contained in these easy-to-understand tools in the areas of operation of the Military Store (Front and Back Office), Contact Center, Post Office and Internal Portal-Self-Service. The objective of creating the Milk-run culminates in the elimination of wasted time in the distribution of correspondence, covering a route and a daily schedule performed by a specialized team, allowing frequent distribution/supply and maximizing the use of transport [34,35].

### 3. Methodology

The Portuguese Air Force is a governmental organization that is an integral part of the system of national forces, having as its main mission to cooperate in the military defense of the Republic, carrying out missions of air operations and the defense of airspace. It is characterized as a cohesive, disciplined, agile, competent, professional organization focused on the accomplishment of the missions assigned to it since 1 July 1952, the date on which it was established.

To achieve the research objectives, we adopted a case study approach which was found to be the most adequate method due to the complexity of studying a lean management project in a military organization. Yin [36] states that the essence of a case study is based on a central trend among the various existing studies, clarifying a decision or a set of decisions taken related to why they were adopted, how they were implemented and what was the result obtained. This type of research is characterized as a particularism, deliberately focusing on a specific case with a unique operating model and characteristics, with the aim of contributing to the understanding of the phenomenon of interest.

Due to the complexity of the phenomenon, the case study methodology was found to be more adequate to analyze the implementation of functional tools on shared Services through Lean Methodology. In this specific research, and being an approach to a case study, Yin [36] characterizes it as an empirical investigation, collecting data from direct sources, from a scenario inserted in the real context. The use of this method is appropriate for the investigation of sets of events over which there is no control by the investigator. The collection and specific analysis of data are the main characteristics of the techniques applied, and there are collections and analyses of various working tools between documents, observations and interviews.

Among the techniques listed, each one emerged with a specific objective for the conclusion of the study. With regard to the collection and analysis of documents, this arose through a literature review and searches in archives, regular surveys as well as access to internal programs. The observation technique was applied to ensure that the results obtained are reliable, being divided into direct and indirect observation, including the field investigation of the studies under analysis [37].

The interviews appear as a complementary method for the study in question, with the main objective of complementing the data contained in the documentary analysis. Applying the concepts of Goode and Hatt [38], the interviews should be clear and with guidelines, and may be divided into structured and unstructured interviews. The sample of interviews collected, 20 in total, had an intentional character, being selected military and civilians from the Air Force General Staff.

Briefly, the research focused on the Shared Services models [14] applied in the Air Force General Staff, as well as on the tools adopted in the same place [26–28], through the collection and subsequent analysis, of documents and data on the functioning of the Military Store, Contact Center, Post Office and the use of FAP internal Portal functions. In addition to this analysis, visits were made to the same sites in order to integrate a more detailed perception of the existing facts. Due to the military nature of this organization, the respondents were indicated by the competent services. We asked for respondents with the following inclusion criteria: (i) being key decision makers in the lean management process; (ii) having participated in the lean management project implemented from January 2015 to March 2019. The field observation and the interviews were conducted from November 2018 to July 2019.

In terms of the qualitative analysis technique used to interpret the data reproduced in the interviews, it was structured using content analysis as indicated in Figure 1, relating the semantic structures with the sociological structures in order to articulate the texts with the factors that are implicit in their characteristics.

The total universe encompassing the use of all services of the Portuguese Air Force has a total of 6580 military and civilian personnel that are active and within the organizational structure, which are 81.5% male and 18.5% female. Within the sampled staff, the sample was divided into four categories: 687 civilians, 1465 corporals, 2555 sergeants and 1873 officers. Concerning qualifications, 29% of employees had higher education, 59.2% had secondary qualifications and 11.8% had other training.

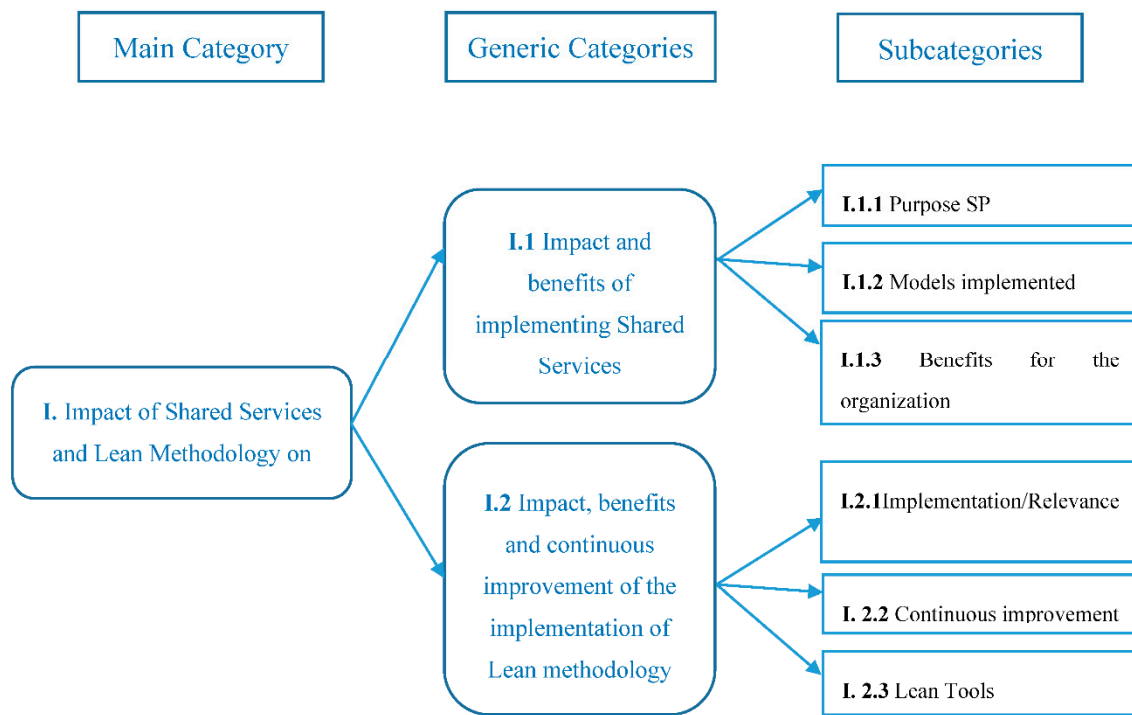


Figure 1. Characterization and coding of the interviews.

#### 4. Presentation and Discussion of Results

The collected and explicit data justify the concepts addressed, characterizing the unification of services through semi-autonomous management [39], allowing the consolidation of support and support functionalities [40] and ensuring the simplification of processes by increasing customer demand [2]. The existence of organizational arrangements [8] allowed the aggregation of functions, giving rise to the formation of the Military Store, the Contact Center, the Post Office and the internal Portal, given the objectives outlined by the organization, forming a sustainable pillar with a successful project [10].

It should be noted that the joint approach to all research questions culminates in the observation, direct and indirect, of the Military Store, the Contact Center, the Post Office Sector and the Internal Portal. The purpose of using these concepts, associated with shared services and the Lean methodology, is common and pursues the same objectives, so that the reasons that lead to a sustainability of all of them end up allowing the existence and application of processes of continuous improvement, adding value to the organization.

##### 4.1. Military Store

The analysis carried out indicates a process of continuous improvement and a constant insertion of new functionalities with the function of stimulating all processes using highly qualified teams [18]. A summary of the key sentences are presented in Table 1. Face-to-face support at the Military Store offers a wide range of services located in a single location, reducing the dispersion of support services and increasing the speed with which processes are handled. The results obtained show that the implementation was successful, with an efficient reduction of 28% in the total staff since 2015.

The data regarding renewals indicate that 1844 renewals in the identified period resulted in 2417 processes, and that 2809 renewals resulted in a total of 3396 processes. In this way, it is possible to observe that the demand for face-to-face services, including the number of processes resolved by face-to-face services, goes from a minimum of 348 to 484, representing an increase of 39%, and a maximum of 779 to 1391, meaning an increase of 78.5%, making a total number of processes of 9659 with 5542 face-to-face services.

**Table 1.** Content analysis: the Military Store.

Interviewee	Text
E1	The well-being of the military is important; the centralization of services in a single location was a great adaptation.
E2	The centralization of services has significantly reduced the waste of time involved in obtaining documents. It is essential to continue to improve these processes by adding new functionalities.
E3	It would also be important to centralize the issuing of identity cards, route plans and all the necessary codifications in the Military Lodge.

Through direct observation, it is possible to identify some events that are not being followed upon and that what is properly stipulated is not being worked with. An example of this is the daily non-use of the visual management board where the control indicators [22], the annual calendar, the training plan, the layout and the problem solving are all included. The lack of daily use of this framework does not allow the existence of one of the fundamental factors of the Lean concept, which is continuous improvement and does not focus entirely on the elimination of the various types of waste: MUDA, MURI and MURA [6].

From a user/client perspective, it is possible to identify that the layout for carrying out the relevant services is not at all ideal and the waiting time is longer than would be expected due to the lack of human resources. From the employee’s point of view, the relevant services are based on a password system and the back-office work is carried out immediately in the front-office due to the existing gaps in terms of human resources. A waiting time is considered to be normal, as a slight delay may occur due to the overlapping of functions. Currently there is a full use of the application of the 5-S tool [32], and there is a dynamic space with the application of the necessary tools to meet the resolution of all existing processes [41].

The results obtained in the interviews are in line with the results obtained from the operation of the military store; the store was considered by all interviewees as a fundamental concept in the organization and characterized as quite relevant for the well-being of the military and civilians of the Portuguese Air Force, allowing the centralization of several processes and reducing their processing time [7], which answers research question one (Q1). The standard of satisfaction was found to be high; however respondents suggest that more functionalities be provided at the military store, i.e., the transfer and centralization of administrative services such as the issuance of military identity cards, processing of route plans and codification of all certificates in their own computer system.

For the implementation of this Shared Services model [14], according to the study conducted on research questions two (Q2) and four (Q4), and despite being a relatively recent project, respondents indicated their belief that the implementation has led to a very significant improvement for the organization, allowing a positive development for customers, employees and for the organization itself that arises through daily Kaizen events [21]. In this way, and therefore meeting the mentioned objectives and research questions in research questions five (Q5) and six (Q6), there is a constant elimination of waste and an application of continuous improvement introduced through the standardization of tasks [33]; whenever possible, new features are also added through suggestions from customers, adding constant value to the organization.

#### 4.2. Contact Center

The Contact Center was found to be the only body able to provide clarification in all support matters. It provides direct support to all the military and civilians of the air force with the themes covered here, mainly in the military store and in the internal portal, thereby allowing the existence of an increase in productivity with a reduced number of resources [17]. Through documentary analysis, it is possible to verify that the implementation of this feature has been accompanied by very favorable growth, and that in the period under review between September 2016 and March 2019, requests for

support emerged in 8303 cases, with the minimum number of requests in November 2016 with 98 clarification needs and the maximum in November 2018 with 580 requests.

On average, there are 16 requests per day, of which the highest peak was recorded in November 2018 with 28 requests for daily clarifications, and the lowest peak was in November 2016 and January 2017 with 5 requests for daily clarifications during both months. An analysis of the content involved in support provision during the period from March 2018 to March 2019, which represents 80% of total demand, shows that the highest number of requests for clarification comes from administrative renewals, with a total of 818 requests for support for this topic. The support regarding subsistence allowances abroad began to be provided in November 2018, so it is possible to detect a large number of requests for support, a total of 219 clarifications, in relation to the remaining issues.

Considering the period under analysis, the demand for clarification arises from civilian personnel, including family members of military personnel, increased to 1806 clarifications, followed by military and civilian Air Force General Staff with 1334 clarifications. As the Contact Center is located in the Alfragide complex, the unit with the most requests for support from this complex is the Lisbon Support Unit, which made 389 requests for clarifications in the period in question. In fact, the objective of freeing up staff for the execution of other tasks is being achieved, transferring several issues that were previously dealt with in the departments to the support line, as argued by Hassanain, et al. [42], thus generating an increase in the value of the service to the customer through the application of various fundamental principles [31]. The general satisfaction of customers can be observed in several affirmations, as depicted in Table 2. This transfer has been carried out without any kind of training for the Contact Center team [39], making it detrimental to continued operation and making the work obsolete, thereby not allowing an effective response as would otherwise be desirable. It is necessary to clarify that the space where the Contact Center is located is not conducive to the correct functioning of these tasks, and that in the same physical space there is a telephone service and a face-to-face service (Military Store), which were inserted through a co-location model [14].

**Table 2.** Content Analysis—Impact of the Contact Center for the Air Force.

Interviewee	Text
E6	The need to ask the Contact Center for clarification on issues is high, which has led to it being the first choice when needing to obtain information.
E7	It is not always necessary to use telephone support, as I often end up getting the information I need via trial and error.
E8	The processes of continuous improvement are recurrent, one of the main focuses of this improvement should be the physical space where the Contact Center employees operate.
E9	In my opinion, there is no need to improve the Contact Center space. The place where the information is provided is not relevant, even if there is a face-to-face service at this place.

The need to clarify doubts on the use of shared services functionalities and the Lean methodology represents one of the reasons for the creation of the Contact Center, which is a focus under study; for research question four (Q4), 80% of respondents consider the existence of the helpline to be very important since not all functionalities are easy to access, thus ensuring the desired effectiveness of task completion [24]. The remaining 20% consider that the functionalities do not need any telephone support.

After a period of adaptation of the telephone support concept, demand has stabilized on a monthly basis. It is important that the work team extends its training to other areas. From this perspective, there is a need to frame new themes, thus continuing to remove the existing overload on the services/directions that process the information, thus allowing an increase in the number of staff of the work team, as well as the improvement of the work space, both of which can be justified by the growing demand that is expected from the adherence to new forms of functionality.

Only 40% of respondents considered that the facilities do not correspond to what would be an ideal scenario, while the remaining 60% considered that the information provided can be given

regardless of the physical location where the information is provided. Addressing survey question six (Q6), in general, all respondents consider that the implementation has led to an improvement for the Portuguese Air Force, adding significant value to the development of all shared services functionalities and supporting the Lean methodology.

*4.3. Post-Office Sector*

The Post Office of the General Staff of the Air Force assumes responsibility for all distribution of documentation in the Alfragide complex. In the period from April 2018 to April 2019, there was a correspondence transaction, via civil mail, of 14,128 documents, with the highest volume registered in January 2019 with 2743 documents sent, and the lowest registration in August 2018 with 451 items. Military mail is sent by own means using a system called SPM, which reached a volume of 3843 documents sent in the same period, with a higher volume of correspondence in July 2018 with 357 documents, and in April 2018 the lowest volume was sent with 217 documents. In total, the postal sector transacted 17,971 documents in a one-year period. However, it is noted that this is an area that requires further refinement of the lean methodology, and no significant improvements in time or resource use have been observed yet. Table 3 provides examples of some improvement areas.

**Table 3.** Content analysis—Impact of the postal sector on the Air Force.

Interviewee	Text
E11	Although the distribution circuit is well defined, the two distributions lose relevance, since the documents that are collected in the afternoon will only be distributed the following day.
E12	There is a very significant mismatch in the distribution of correspondence. There are long periods of time when it is not distributed.
E13	The distribution points are not secure. They are made up of drawers and everyone has access to the documents that are deposited there, whereas only the receiver and the Milk-Run should have that access.

The implementation of the Lean methodology in this sector, as determined by question four (Q4), allowed an evolution in the method of mail distribution within the organization, applying various concepts and focusing on the use of a Milk-Run [43]. Research in the field made it possible to identify all the logistics involved in the simple distribution process, thereby addressing the secretariats’ Standard-Work with regard to the preparation of documents for the collection/delivery carried out by the Milk-Run and its Standard-Work. The visual management framework is largely not being used in the area of problem solving, daily records and extraordinary requests [22], and these should be addressed daily before the start of the sector’s operation through Kaizen events, allowing the concept of continuous improvement to be applied [21]. The management of these processes is done verbally, not coinciding with what was pre-defined at the time of implementation.

The Milk-Run, during the daily distributions, also uses the Kanban concept to perform the replacement of missing material that is necessary for the performance of the tasks, suppressing the possible drop in the stock of materials [34,35] and therefore allowing this functionality to provide a significant increase in value for the organization, according to the approach discussed in research question six (Q6).

The interviewees also identified the poor document security of this process, as they consider that there is a high risk of misplaced correspondence and failures in the distribution sites. Even so, and despite the controversies pointed out above, all the interviewees believe that the implementation of the Milk-Run translated into added value for the air force.



#### 4.4. Internal Portal–Self-Service

The internal portal is one of the functionalities with the highest adherence to the adoption of shared services and the Lean methodology. Through the documental analysis of the data related to the internal portal from April 2015 to July 2018, it is possible to identify that the search for the Self-Service reached 233,554 views. Another feature of this portal is the Knowledge Base, which obtained a total of 78,495 searches during the period in question. The largest demand is in the personal account area, which has reached 282,663 views.

In a more incisive way, addressing all the functionalities available within the Personal Account, it is possible to identify the 73,143 visits that occurred in the period from May 2018 to September 2018; 14,404 visits occurred within the scope of the Seat Note and 7175 visits occurred to determine the consultation of daily allowances abroad. In this scenario, it is identifiable that during the month of May 2018 there were, on average, 249 daily visits to bulletins and statements, and the demand for holiday information was slightly lower over the period, registering the minimum number of daily visits out of the various topics on average, with 55 views in June 2018.

Regarding the Personal Account, 86% of respondents accessed this feature between April 2015 and September 2018, with an average of 385 daily views, with the highest number to be recorded in January 2018 with a total of 808 views and the lowest record to occur in the month of March 2017 with 295 views. In this same period, it is possible to identify the monthly number of new users accessing the Personnel Account, with an average of 135 new users per day, the highest peak in the month of March 2018 with 182 users and the lowest number of users in the month of November 2016 with 111 new users.

With regard to the personnel area, which is part of the Self-Service, the demand level reached 10,064 requests and declarations between November 2017 and November 2018, this excludes the months of December 2017 and August 2018 due to maintenance and internal affairs, which would change the true statistics of the requests obtained. Thus, there were, on average, 915 monthly requests, with a maximum value of 1286 obtained in October 2018 and a minimum value of 736 obtained in November 2018. The largest demand was for the application for registration/renewal of ADM cards with a total number of 3047 applications, followed by a change in the numbering of the citizen card with 1434 applications.

In the same period, the highest demand for requests came from the Alfragide complex of the Air Force General Staff, with a total of 2293 requests. Regarding the declarations automatically generated with a digital signature, 1963 declarations were obtained in the period from November 2017 to November 2018, including a total of 778 declarations generated for school entities.

In addition to the documentary analysis carried out, field research through direct observation of the internal portal platform can be used to identify the existing improvements resulting from the application of this concept. With regard to improvements in the time taken to obtain documents or statements/requests, an evolution was observed since the obtaining of these documents has gone from a whole process that required several steps to obtaining them on the spot in a digital format with an electronic signature. It is also very easy to access personal data through a fast authentication, meaning it is now possible to easily obtain a person's entire professional history.

The figures obtained in the documental analysis identify a high adherence to this functionality, reflecting the evolution that it allowed for military and civilian employees of the Portuguese Air Force, surpassing all expectations that were created during the implementation of the internal portal and Self-Service. The application of these concepts, in line with the objectives of Shared Services and Lean, allowed a better use of the staff to perform other tasks and at the same time provided remarkable customer satisfaction, thereby ensuring organizational growth [12].

In addition to the numerical results presented above, the responses from the interviewees complement this enormous impact on the implementation of the internal portal. All the interviewees indicated that it reflected an improvement in terms of both data consultation and document retrieval, indicating as essential factors the speed of the entire process and the ease inherent in it; they also

highlighted the existing evolution in comparison with the method of obtaining and consulting data and documents that was previously used to show that this service is constantly being improved.

As indicated in Table 4, despite the various functionalities provided by the internal portal, the interviewees mentioned some suggestions that would allow greater satisfaction in the use of this service and greater speed in the processing of information, inserting functionalities such as automatic renewals of driving certificates, requests for renewal of direct WMD and access to evaluation forms in a personnel account.

**Table 4.** Content analysis—Impact of the internal portal on the Air Force.

Interviewee	Text
E16	Obviously, the use of the internal portal represents a great technological evolution and a significant improvement for the air force.
E18	Today it has become easier and quicker to access and obtain documents, as well as to consult my personal data. However, there are many processes and functionalities that could be inserted in the internal portal, such as renewal request functions.
E19	One of the key data areas to be added in the future would be the ability to consult the evaluation sheets. It is a very important data source that requires a lot of logistical elements.
E20	We are able to obtain a large proportion of documents with an electronic signature, allowing for reducing work that I consider to be of little importance, making it possible to devote more time to relevant tasks.

In general, all interviewees characterized the internal portal’s implementation as a success for the organization that provided added value for users and services by making more time available to dedicate to other more relevant processes, while enhancing major financial, customer, quality, team and knowledge transmission advantages through Lean techniques [24]. There are an ability to access and request documents or consultation of data on a daily basis, which speeds up decision making and the recording of functions, allowing the verification of payments received for missions that are carried out, translating the benefits and needs of implementing shared services and the Lean methodology through a systematic reduction in costs [16] and finally allowing the achievement of the objectives [15] mentioned in research questions and research questions (Q3), (Q4) and (Q6).

## 5. Conclusions

The greatest impact was felt in the administrative and support areas, concentrating various services spread throughout the organization in a single location and making it easier to obtain information, documents and their circuits. The combination of all the models implemented (the military store, Contact Center, post office sector and internal portal) resulted in an organizational restructuring that made it possible to boost the provision of services to the organization, enabling better management of resources. Regarding the data obtained and analyzed, it is noticeable that more and more military and civil servants resort to obtaining support in these services, allowing a greater workflow in the departments that process the information without there being constant interruptions.

There is an enormous need to use the various services implemented, where the information is concentrated, to solve the problems that arise daily, allowing a simplified, rapid and effective resolution with less bureaucracy being involved. The main focus, the use of human resources, is generally being achieved through the elimination of duplication of tasks and the provision of specific training to perform the required function, together with the concentration and processing of information in a single location. Furthermore, by identifying a collective and collaborative project, our findings highlight the importance of implementing open innovation in the public sector, as previously recognized by Mergel and Desouza [44] in the case of Challenge.gov. The implementation of these projects requires special knowledge to address the complexity and the identified barriers associated with the implementation of lean management practices. As such, it is most likely that specialized public organizations lack

the knowledge to implement lean management on their own, thereby highlighting the importance of open innovation intermediaries in local government and the public sector, especially by integrating networks of companies and clusters, as suggested by Bakici, Almirall and Wareham [45].

Our study also presents managerial implications. It is important to verify the opinions and facts that allow, with the application of these concepts, a contribution to a continuous improvement of the company/organization. Given that the objects under study depend directly on their frequent use, this allows managers to attribute responsibility for success not only to the implementation of functionality, but also to its appropriate use by work teams and end customers.

Observing the results, taking into account the research questions explored and the objectives outlined, it is possible for managers, who intend to approach the concepts mentioned here with greater focus, to realize the needs, difficulties and objectives inherent to the implementation and monitoring of continuous improvement of shared services and the lean methodology. On the other hand, although we are dealing with the military sector, the study contains data that may serve as a basis for the need to adopt these concepts in other business areas, making businesses more sustainable.

For policymakers, this study also alerts them to the importance of implementing open innovation policies not only through the stimulation of introducing open innovation intermediaries in the public sector but also through knowledge creation and accumulation, as well promoting its dissemination to other public and private organizations. The path follows the suggestions of Yun et al. [46] for 'perfect' open innovation policies: knowledge and technology production, distribution and consumption.

It is very important to make sure that the conclusions, and the data associated with them, are exclusively intended for the sample itself, and any interpretations of this work should be cautious, taking into account the actual working context of the Portuguese Air Force and avoiding transpositions and/or direct comparisons with other areas or organizations outside the military sphere.

Resistance to change and the consequent resistance to the use of new systems is defined as a limitation that is sometimes reflected in the translation of the results obtained. Their dispersion, as well as the different time periods analyzed, make the comparisons and analyses performed more complex. There is also a limitation that is related to the fact that there is also a direct observation that, as there are several shared service models and Lean methodologies adopted, it is not always possible to closely follow all the decisions and strategic plans to be adopted, as noted by Cheng [47] resulting in the consequent absence of particularities, ideas and decisions that could result through interactions.

However much the results obtained show a high degree of user satisfaction, or an adherence that justifies the continuous investment in this type of services and methodologies, often the main focus ceases to be concern over the resources used. As we are considering an administrative and support area, it is essential that the human resources assigned to these functions are properly trained and that they are able to work under conditions that allow the correct monitoring of this type of implementation. In this context, it would be extremely important in the future to study the extent to which the relationship and concern with the human resources used in these projects accompanies the expected results with the application of shared service centers and the Lean methodology.

In short, this impact is being very beneficial for the Portuguese Air Force, a branch of the armed forces that pioneered the adoption of the identified themes, and it would be very useful if the internal knowledge were shared with the other branches of the Portuguese armed forces, thus suggesting that in terms of future research, a plan for the implementation of shared services and the Lean methodology in national military organizations should be created.

This research also presents some limitations as well as indicating directions for further research. First, although the selected case study is considered as adequate to extend the relevant research in this field, it is still a case study. Thus, the results must be read taking in consideration the limited generalizations being made. However, this opens avenues for future research by testing in other organizations or conducting quantitative studies. Second, we explored the impacts mostly from the operational perspective, which could be considered a limitation. Future research should more deeply explore other dimensions such as the human dimension (e.g., culture, leadership, engagement),

communicational dimension (e.g., reputation, image) or strategic dimension (e.g., investment, modernization, expansion). Third, although the number of interviews conducted was considered to be adequate, a bigger sample could open the path for quantitative research to propose and validate a model for the implications of the lean methodology.

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