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THE ROLE OF CUSTOMS PROCEDURES IN REDUCTION OF MAINTENANCE, REPAIR AND OVERHAUL COSTS IN THE AVIATION INDUSTRY

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Abstract

Scope of the article will cover analysis of special customs procedures and other facilitations that can be used in MRO business. The two research questions that are answered in the paper are: what customs procedures can be used, how they work and if those can reduce costs of MRO operations significantly. There are two research methodological approaches used in this article: qualitative and quantitative. Results show a great difference in savings between two variants, in which one would present a very basic level of special customs procedures usage and a variant in which all presented possibilities would be applied. Research results showed many possibilities for changes in the customs strategy of a company interested in evolving it and generating savings from many facilitations due to usage of special customs procedures as well as a compact explanation of how the application of a special procedures process looks. This article may be interesting for both: scientists and specialists working in the field of customs as well as for the companies working internationally with a lot of imported materials needed to perform work on an engine or aircraft. The authors' conclusion is that even small companies might learn a lot from the analysis given in this article, due to the fact that the knowledge gathered here can give a greater understanding of customs knowledge presented in this article, combined with knowledge about other taxes will give an extraordinary advantage on the market for companies in MRO, or a similar industry.

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Introduction

The article will cover the topic of the role of customs procedures in reduction of maintenance, repair and overhaul costs in the aviation industry. Maintenance means the overhaul, repair, required inspection or modification of aircraft or the removal of a component from it or its installation on aircrafts. It does not however include elementary work, servicing or any work in the course of the production, manufacturing and attesting of aircraft (Wilczewski, 2018, p. 8). It is a very interesting matter because there is not much literature about it or scientific research devoted to this topic. The scope of the article will cover financial analysis of a few special procedures and different solutions used to mitigate the cost of operation of such MRO companies.

Researchers either from aviation or finance do not cross their field of study, especially in the customs side of the business. It might be because there is plenty of law-oriented literature about customs itself, besides just legislature (Rymarczyk, 2017; Laszuk et al., 2017; Oktaba, 2019). However, the literature does not give the knowledge and experience from day-to-day operations. This is something gained over time, after hours of work, studying and getting opinions from other specialists or customsities. The usage of customs procedures and other facilitations is a know-how that firms do not really share (Garud, 1997). It is a strategy built over years and specialists keep the knowledge to themselves, as it is a very valuable asset on the market. This is the first reason for bringing this issue to light, so that more people can find information on the matter to use either at work or in businesses.

Some research works talk about the topic of smart usage of customs procedures that allow us to improve operations of firms but in the case of the aviation industry it requires a custom fit (Desiderio, 2019). Naturally, customs and settlement of VAT is important for maintenance, repair and overhaul (MRO) companies due to the fact that most suppliers of spare parts or tooling are from outside of the EU[3]. Also, a company has to be prepared to offer services for aircrafts or engines from third countries. If the company is not prepared for all of that, from the customs point of view, it exposes itself to unnecessary costs[4]. That applies to all European Union (EU) countries, because all of those under the same customs union (Gormley, 2009). Certainly, regulations on the country level also have to be considered, but basics are the same for all in the EU[5].

Overall, the customs issue is important for all MRO companies, because aside from the fact that it is necessary to operate, it can prevent unnecessary spending on customs duties and VAT. One of many ways to mitigate needless spending is giving necessary attention to customs issues, since not obeying the law can generate even more costs[6]. Naturally, if the company wants to, it can treat all goods under customs supervision the same as released for free circulation. But then, the entity would have to prepare for huge additional costs. That is why special procedures were invented, to help companies in importing goods from outside of the EU to reduce costs of operation (Popa et al., 2015).

Another reason for choosing this topic is because this case seems to be overlooked and not talked about enough in comparison to how important of an issue customs in the aviation industry are. The aim of the article is to show how a smart application of customs procedures could reduce the operating costs of the company representing the MRO industry. There is no special way of using the procedures themselves, because there is only one customs code mentioned before and everyone has to obey those rules. Smart usage is more about knowing the possibilities and reaping from those, that is why know-how is significant.

Scope of the article covers analysis of special customs procedures and other facilitations that can be used in MRO business. The main objectives of the article are the following:

1) to analyze the costs in MRO business resulting from operations on foreign aircrafts or parts of the aircrafts.
2) to analyse and identify materials used during MRO and logistics.
3) to research and discuss whether companies can use special customs procedures to mitigate costs of operation and of what size is the saved amount of monetary resources.
4) based on the research analysis and results to provide research based on simulation that will show the possibilities of limitation of costs connected to operation of MRO companies by application of special

[3]https://www.investopedia.com/ask/answers/050415/what-companies-are-major-players-airline-supply-business.asp (Accessed 08.12.2020).

[4]https://kghcustoms.com/en/insight/special-customs-procedures-need-become-standard-business-practice/ (Accessed 08.12.2020).

[5]"The Union Customs Code (UCC) defines the legal framework for customs rules and procedures in the EU customs territory, adapted to modern trade models and communication tools." https://ec.europa.eu/taxation_customs/union-customs-code-ucc-introduction_pl (Accessed 29.03.2022).

[6]Act of September 10, 1999, Tax Offenses and Fiscal Violations (Journal of Laws, No. 83, item 930).

customs procedures and other facilitations, which are admission to trade, inward processing, admission to trade after outward processing and airworthiness certificates.

The research is relevant and has novelty, because in this work analyzing methods used in different industries are interesting, especially in the case of aviation.

Wilczewski (2018) presented how those possibilities could be used to lower costs of the company operations and proved it by performing simulations. This author was focused on differences between Switzerland and the EU. It might seem that it has higher purpose than comparing the EU and Poland, because Switzerland is not a member of the EU. However, it is necessary to remember that law on a country level also makes a difference even when in theory the standards should be the same over the entire EU (Traversa & Flamini, 2015). Sadly, this is not the case which can be clearly seen on the example of art. 324 Commission Implementing Regulation (EU) 2015/2447[7]. This article allows special cases of discharge of the inward processing IM/EX procedure. This article was supposed to level competitive chances of aviation companies in actual simplification of customs formalities. Unfortunately, simplification of EU protocol was not followed by national VAT law, which effects an impossibility of practical use of that article. The problem is connected to Polish VAT law. Art. 324 paragraph 1 of Commission Implementing Regulation, which states that "(…) for the purposes of discharging the inward processing IM/EX procedure, the following shall be regarded as re-export: (…) the delivery of aircraft[8]". According to point 3 of the article:

"In the case of paragraph 1(c), the supervising customs office shall allow the inward processing IM/EX procedure to be discharged once the goods placed under the procedure have been used for the first time for the manufacture, repair including maintenance, modification or conversion of aircraft or parts thereof, on condition that the records of the holder of the procedure are such as to make it possible to verify that the procedure is being correctly applied and operated[9]."

[7]Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015 laying down detailed rules for implementing certain provisions of Regulation (EU) No 952/2013 of the European Parliament and of the Council laying down the Union Customs Code OJ L 343 29.12.2015, p. 558.
[8]Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015.
[9]Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015.

Customs Office allows closure of the procedure, if goods under this procedure will be used for the first time. Following additional explanations from the European Commission, application of art. 324 means that imported goods in the agreed time of its use, according to customs regulations, is already found as in free circulation. Following that interpretation, there is a clear legal fiction in which a piece of an aircraft is at the same moment seen as exported and as good in free circulation. As claimed by the Commission, "delivery of aircraft/first use" moment can be recognized as the moment of submitting a procedure settlement declaration. That would be the ending of the inward processing procedure and at the same moment a point in which tax liability arises[10].

Article 33, paragraph 1 and 2 of the VAT Act obligates taxpayers to calculate and report the tax in a customs declaration or wait for a decision on the amount of tax from the Customs Office[11]. Settlement of procedure following art. 324 is done by settlement receipt which has not been recognized in the VAT Act as a document suitable to calculate and report tax[12]. It must be inferred that in this situation the only option is a decision provided by the Customs Office basis on art. 33 paragraph 3 of the VAT Act, which once again allows the decision of the Customs Office, but only after submission of the ending settlement. In the given situation the taxpayer is responsible for unintentional and faulty delay in settlement of tax liabilities which generates additional interest. What is more, the present situation makes it impossible to settle VAT, the taxpayer is forced to pay the whole amount of VAT and interest in ten days from the day of receiving the decision from the Customs Office[13]. In practice it means that what was meant to be a facilitation is an obstacle in the cashless import VAT settlement. The entity is forced to bear additional costs of VAT with interest that cannot be settled. Aircraft parts are terribly expensive, no MRO company would use this solution in the form that it has today because it is completely unprofitable. In this context, the authors have no doubts that due to the VAT Act, art. 324 is unusable, which significantly decreases the competitive chances of Polish companies on the international market.

[10]https://ec.europa.eu/taxation_customs/sites/taxation/files/simplified_discharge_en.pdf (Accessed 28.03.2021).
[11]Act of March 11, 2004, on Tax on Goods and Services (Journal of Laws No. 54, item 535).
[12]Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015 laying down detailed rules for implementing certain provisions of Regulation (EU) No 952/2013 of the European Parliament and of the Council laying down the Union Customs Code OJ L 343 29.12.2015, p. 558.
[13]Act of March 11, 2004, on Tax on Goods and Services (Journal of Laws No. 54, item 535).

Literature overview

Consideration of prior, relevant literature is essential for all research disciplines and all research projects (Snyder, 2019). In the case of customs in MRO business, there is little to no literature focused specifically on this issue of the aviation business. Wilczewski (2018) paper performed a deep analysis of all possible procedures that might be used in a country that is outside of the EU but at the same time is strongly connected to it by many bilateral agreements. At the same time the literature does not mention airworthiness certificates and art. 324 of Commission Implementing Regulation (Church, 2007, p. 15). Another problem is that the literature does not show the financial possibilities connected with usage of special customs procedures and other facilitations which is cost limitation. This would be another place for improvements that can be filled by the authors' work.

A paper by Radžiukynas (2007) is related to this topic and expresses the purpose, economic rationale and main features of customs procedures with an economic impact on the example of the Lithuanian market. It analyses the application of these customs procedures after Lithuania's accession to the EU (Radžiukynas, 2007). Although Lithuania's legal status is not the same as Poland's, it could be compared on level of impact of customs procedures on the business since the core procedures within the EU are the same. Rymarczyk (2017) focused on customs in MRO as a system of customs relief. EU regulations give a lot of possibilities to entrepreneurs and three of them are using 0 customs rate, tariff quota and tariff ceiling (Rymarczyk, 2017). Due to one particular regulation, aviation parts used for building or renovating whole aircrafts or parts of them are released from customs duty to facilitate growth of aviation related companies based in the European Union[14]. At the same time Rymarczyk (2017) only explains the system of tariff relief and three options provided by the legislators. The authors are referencing the Union Customs Code[15] and explain the meaning behind pages of legislature in a short and approachable way. Procedures discussed are: transit, export, admission to trade, inward processing, outward processing, temporary admission and a few more less relevant items for the topic of customs in maintenance, repair and overhaul.

[14]Act of March 11, 2004, on Tax on Goods and Services (Journal of Laws No. 54, item 535).

[15]The Union Customs Code (UCC) defines the legal framework for customs rules and procedures in the EU customs territory, adapted to modern trade models and communication tools. https://ec.europa.eu/taxation_customs/union-customs-code-ucc-introduction_pl (Accessed 29.03.2022).

Again, it is a very general knowledge, not concentrated on any kind of particular business and for sure not for aviation. It presents options but it does not give a custom fit to problems faced in MRO. Not to even mention the financial aspect of the article, this will only cover worked out know-how that is not presented in this publication. In this case, the authors' paper is going to fill in another gap in the current state of knowledge on custom fit solutions financial benefits.

To sum up, the authors did not find any other researches devoted to cost reduction in MRO business. After the literature review, the conclusion is that the topic of optimization of customs usage in businesses is not a common subject in the world of customs. That is because, despite the customs union in the EU, most of the time local law is changing standards to the point that only local authorities and specialists will be able to cover it by personal experience.

Data and methods

Choice of research methodology should be careful and based on many aspects. The basic ones are the authors' beliefs and interests. Although it cannot be the main reason to choose some kind of method because it might turn out that this research will give no sufficient results. That is why other important factors are: aim of the research, epistemological concerns and norms of practice of the researcher and other previous work in this area.

There are two research approaches used in this article. Since the beginning of the work is theoretical, the research methodology was qualitative, "(…) that helps to address questions that cannot be answered by way of quantification." Qualitative methodology is focused on various sources or information like a focus group, interviews or observations (Ahmed et al., 2016). Next, the research method was desk research. "Desk research is not about collecting data. Instead, your role as a user researcher carrying out desk research is to review previous research findings to gain a broad understanding of the field" (Travis, 2016). This type of research is a secondary type of research, and it requires usage of already existing data, that later is collected and summarized to conduct some overall conclusions. It includes materials from literature, articles, databases and other research. However, desk research has its downfalls. "Secondary research is much more cost-effective than primary research, as it makes use of already existing data, unlike primary research where

data is collected first-hand, by organizations or businesses nesses or they can employ a third party to collect data on their behalf[16].” Desk research is rather simple if proper order is obeyed and from the start there is a straight objective and plan. Following that, another form of research can be added since it might enrich the work and give even more credibility.

In the case of introduction and literature review, desk research made it possible to create a wider perspective for the analysis and opportunity for investigation of whether customs have a big impact on operation of MRO companies. Similar to the case of criminology and criminal justice, qualitative research provides “depth of understanding” much more that statistical analysis (Tewksbury, 2009). That allowed us to understand how special customs procedures and other facilitations can improve the customs strategy of a company That option of research methodology and research method was very effective since it presented a background for further analysis in a simulated data base. For the research results analysis, the methodology is changed to a more suitable approach, since the result will have to be calculated. The first contrast is that the research methodology is changing from qualitative to quantitative. “Quantitative research, however, involves a systematic scientific investigation of quantitative phenomena and their relationships by employing mathematical models to test theories and hypotheses pertaining to the natural world” (Ahmed et al., 2016). What is more, the research method changed from desk research to simulation. “A simulation is a (…) model in which experiments can be conducted, creating a higher level of completeness than a normal experiment. Simulation models can assist in both complex and simple experiments, and they can be used with almost any social process[17].” Simulation might be a solution when the point is to show an impact of an outside factor on sample data and the access to original data is impossible. But it does not make any difference whether the data should be historical or random, it would not work if the authors had to perform some kind of analysis based on true data. However, in this research the point is to show possibilities of savings, not the real historical data from some company that is already applying such solutions (Hill & Malone, 2004).

[16]https://www.questionpro.com/blog/secondary-research/ (Accessed 27.05.2021).

[17]https://methods.sagepub.com/video/what-is-simulation (Accessed 29.05.2021).

Figure 1: Research process

Source: Own work based on https://www.slideshare.net/laurieloranta/simulation-in-social-sciences-lecture-6-in-introduction-to-computational-social-science (Accessed 29.05.2021).

The tool used in the research is a simulated data base of 200 parts values needed for the repairs, from the range $ 1,000.00 – $ 1,000,000.00. Based on mathematical processes, it will allow to gather results of the research easily and analyze it quickly[18]. Such a way of performing research is very popular in science. “Scientists first understand the physical laws that govern the phenomenon. It is exactly what the authors are performing on the simulated database prepared for this paper. Phase 1 of creating the database was collection of the data that would be used later for calculations. Phase 2 focused on data organization in Excel files. Actual calculations on a group of variables will be Phase 3 and findings would become Phase 4 (Saunders, 2009).

Summed up values for both variants of calculations will show a difference proving the authors’ research goal. Data gathered by this type of research has high validity and reliability, because the dataset is accurately measured, and the calculations could be easily replicated by others[19]. In this way the authors will be able to thoroughly analyze whether the assumptions made are reflecting reality and it is really possible to save monetary resources by application of special customs procedures and other facilitations. Moreover, this type of research shows immediate results and precise values that might be saved, so it is not an imaginary thing that may or may not happen due to actions taken. It shows reliable data, possible values, that might be used as a sample analysis for any company trying to find out

[18]https://www.questionpro.com/blog/quantitative-research-vs-qualitative-research/ (Accessed 05.01.2020).

[19]https://www.questionpro.com/blog/quantitative-research-vs-qualitative-research/ (Accessed 05.01.2020).

whether it is worth getting through the stages of planning and authorizations.

Simulation research definitely helped the authors to perform trustworthy analysis that confirmed the statement presented in the first two sections of the paper and prove that customs issues can have a tremendous, positive or negative, impact on a firm's finances and overall operation in business. What is more, this type of research may be applicable in many other fields and gives a lot of possibilities.

Research and results analysis

Overall, customs are a necessary thing in every company that operates worldwide due to a lot of import and export, but for MRO businesses customs issues are more complicated than for the typical manufacturing company. When the needs of MRO are analyzed, we need to go through each step of operation. First a whole airplane or only an engine, depending on the company's services, has to be imported to the MRO facility. At this point there are two options: the plane / engine is in free circulation and there are no formalities connected with customs, or the plane/engine is under customs control and is imported to the facility first with the use of T1 document (Rymarczyk, 2017), that allows us to move such goods[20], then it is placed under the inward processing procedure, that as stated in the first section, allows us to carry out maintenance, repair or other necessary operations (Rymarczyk, 2017).

If the company could not use the inward processing procedure, it would have to pay for customs duties. Those values are huge, since the price of an engine can vary from 12 to 35 million dollars[21] and a whole aircraft can cost even 89 million dollars (Bodell, 2021). If the value of the customs duty, which is around a few percents, and 23% VAT[22] were calculated from the value of the aircraft or even only an engine, and then had to be paid, it would be an enormous financial strain for the company, even if this value could be later deducted from the tax statement. That is one of many reasons to get an authorization and actively use it in operation of the company.

If the company got through all formalities connected to transporting the aircraft / engine to the facility, then there are a few scenarios that might happen during MRO of that machine. The authors will analyze possible situations and provide explanation on how customs are integrated in the process of maintenance. The first situation that most probably will happen is that new exchange parts for the ones that are taken out will be needed for this engine or aircraft. Most aviation parts manufacturers are outside of the European Union[23], so most likely new parts will require customs clearance. This time there is only one possibility, if the company is buying such new parts, no matter what customs status the engine / aircraft has, those have to be set for free circulation. Here the best possibility is to apply 0% duty rate based on European regulations that allow such facilitation for aviation parts[24]. The authors already discussed this topic in section one, in this way the company will not pay duty on those parts, only VAT. This also is not an issue since VAT in this situation can be settled[25]. After all, the cost that the company has to bear is only the cost of the part itself.

Another scenario to consider is when the company wants to send some parts for repair. Now, there are four scenarios, presented below.

1) Part from engine/aircraft in free circulation is sent for repair to a facility in the EU. This situation obviously does not require any action.
2) Part from engine/aircraft under customs control is sent for repair to a facility in the EU. Only required document is T1.
3) Part from engine/aircraft in free circulation is sent for repair to a facilit outside of the EU. Then the export for outward processing procedure is required. It allows us to show that the company is sending the part outside of the EU and shows exact value of the part. Because when it will be coming back the company will place it under admission to trade after outward processing and be able to leav the value of the part out of the equation, customs duties will be paid only for the value of the service. Certainly, if the repair was under warranty, then additional proof can be attached to the customs declaration that will allow us to suspend any liabilities. In the case of the outward processing procedure, the given part has come back from repair, that

[20]Convention between the European Economic Community, the Republic of Austria, the Republic of Finland, the Republic of Iceland, the Kingdom of Norway, the Kingdom of Sweden and the Swiss Confederation, on a common transit procedure OJ L 226, 13.8.1987, pp. 2–117.
[21]https://www.aerotime.aero/23085-5-things-about-jet-engines (Accessed 28.04.2021).
[22]https://extisztar4.mf.gov.pl/taryfa_celna/MeasurecnCode=8411110010&country=&date=20210522&lang=PL&page=1 (Accessed 22.05.2021).
[23]https://www.namf.com/top-12-aerospace-parts-manufacturers/ (Accessed 28.04.2021).
[24]Consolidated version of the Treaty on European Union OJ C 202 7.6.2016, p. 13.
[25]https://poradnikprzedsiebiorcy.pl/-nie-wszystkie-faktury-daja-prawo-do-odliczenia-vat (Accessed 08.05.2021).

is a mandatory rule. Because if the company sends the part for outward processing, it kind of declares that it will come back. If the part will not come back, then a customs declaration correction is required. Procedure needs to be changed from export after inward processing procedure to typical export[26].

4) Part from engine/aircraft under customs control is sent for repair to a facility outside of the EU. The proper procedure is export after inward processing. That is because if a whole engine/aircraft is placed under inward processing procedure, then accordingly the part removed from that engine is also under inward processing procedure. It actually ends the history of that part and it does not have to come back from repair, differently than in the case of the outward processing procedure. If it does, it is just simply placed under the inward processing procedure once again. What is interesting, if a good is placed under inward procedure, and the service was done under warranty, an invoice for $ 0 cannot be used because in this case there always has to be some kind of value. The reason for that is rather simple. Goods under inward processing procedure are entrusted goods. The Customs Agent calculates customs duty based on the value of the material that is decelerated on the invoice and secures it on the guarantee. If the Agent would use only an invoice for service that has $ 0 value on it, the Agent would not be able to calculate customs duties. Opposite to outward processing, in the case of warranty $ 0 invoice is not a problem because the value of the material is taken from the export invoice that is always attached to the customs declaration[27].

After the repair the aircraft/engine has to be exported. If it was in free circulation and no parts under inward processing procedure were mounted into it then no additional action is needed. If the whole machine was under inward processing procedure, then settlement of inward processing procedure is needed and export under T1 document.

One more interesting special procedure that can be useful in this type of business is temporary admission. Every future specialist has to start from basics and work on becoming a better professional in their field. There are no great mechanics or engineers straight from school, knowledge gained in school and training is important but one thing that is truly valued in any branch is experience gained over time. And what is needed to gain experience and become a real professional is lots of training. That is the moment when temporary admission comes into the picture, because it allows us to bring an engine or aircraft from outside of the EU for various purposes from exhibition to training. The key is that the state of the imported good cannot be improved or degraded.

Finally, there is the topic of 0% duty rate and art. 324 of Commission Implementing Regulation[28]. Usage of both of those solutions was covered in the previous section. Simply, if airworthiness certificates are available and used, the duty rate equals to 0%. It is a great way to save resources by cutting off costs of customs duty. The case of art. 324 is much more complicated, due to the fact that practical use of this solution is almost impossible due to very high costs as explained earlier. There is not much that can be done about this matter unless proper authorities will not take a close look at it and propose some changes in legislation. That would enable entrepreneurs to take full advantage of this article just like it is possible for companies in other countries of the European Union. Actually, in the authors opinion the only thing that can be done is putting endless pressure on legislators by writing letters to the Ministry of Finance. It might be too small and complicated of an issue to engage the press and public opinion. However, until this happens companies have to take as much as they can from other procedures or facilitations that will make their work easier.

In the research done by the authors there are three scenarios. The first one - admission to trade (4000), the second - inward processing (5100), and the last one - admission to trade after outward processing (6121). In each of those scenarios the authors provided a simulated database, with appropriate factors influencing it, to perform an analysis and find the difference between costs to be covered by the company before and after application of special customs procedures and suspension from customs duty. The authors will now go through each scenario and discuss what factors were taken under consideration during the calculations and why. After that, two versions of calculations will be explained, and finally those two versions will be compared to each other by usage of graphs, in order to draw conclusions.

[26]https://puesc.gov.pl/documents/10180/19224/Instrukcja+wype%C5%82niania+zg%C5%82osze%C5%84%20AISIMPORT+AESECS2+NCTS2+wersja+2.0.pdf/27c6c55c-d28f-4d0f-86ef-eb835a017b94 (Accessed 30.04.2021).

[27]https://puesc.gov.pl/documents/10180/19224/Instrukcja+wype%C5%82niania+zg%C5%82osze%C5%84%.20AISIMPORT+AESECS2+NCTS2+wersja+2.0.pdf/27c6c55c-d28f-4d0f-86ef-eb835a017b94 (Accessed 30.04.2021).

[28]Commission Implementing Regulation (EU) 2015/2447 of 24 November 2015 laying down detailed rules for implementing certain provisions of Regulation (EU) No 952/2013 of the European Parliament and of the Council laying down the Union Customs Code OJ L 343 29.12.2015, p. 558.

The first scenario to examine is admission to trade with and without usage of tariff suspension. Factors taken into calculations are value - random value from range $ 1,000.00 - $ 1,000,000.00 VAT 23% - amount of VAT to be paid, rate - rate of customs duty connected to given HS Code, certificate - certificate of airworthiness that allows us to apply 0% duty rate. Now, two versions of calculations are meant to be considered. First one assumes that there are no certificates available, or the entity chose to not use them in the customs declaration. The second one assumes that usually certificates are available, to keep it more reliable the authors decided to leave a few values without the certificates as it might happen in real life that not every part will have those, for example if it is scrap. To calculate values of customs duties, the authors developed a formula in the Excel file that is taking all factors under consideration.

$$Value * VAT\ 23\% + Value * Rate = Variant\ 1 \quad (1)$$

Version 1 calculates value of customs duties by multiplying value by 23% of VAT and adding to it multiplied value by rate (%). This gives the precise value of customs duties without application of tariff suspension based on the airworthiness certificate.

$$Value * VAT\ 23\%\ or\ Value * VAT\ 23\% + Value * Rate = Variant\ 2 \quad (2)$$

Version 2 has an additional condition of certificate availability, value of custom duty obtained by multiplication of value and rate percentage is added to calculated value of VAT only in the case where a certificate is not available. Next step in the analysis will be summing up values for variant no 1 and variant no 2 and comparing it to check whether the authors' hypothesis will be proven.

Table 1: Legend for sample HS Codes rates used in simulation

(4000) Admission Trade	Examples of HS Codes Rate
8411910090	2.70%
9033009000	3.70%
7317159590	3.70%

Source: Own work.

Table 2: Data variables for simulation no 1: Admission to trade (4000)

Variables	Characteristic
Value	Random value from range $ 1,000.00 - $ 1,000,000.00
VAT 23%	Amount of VAT to be paid
Rate	Rate of customs duty connected to given HS Code
Certificate	If certificate of airworthiness that allows us to apply 0% duty rate
Variant 1 (4000)	When there is no certificate used, so total amount of duty to be paid is equal to amount of VAT and customs duty
Variant 2 (4000)	When there are certificates used, so total amount of duty to be paid is equal to amount of VAT only

Source: Own work.

Above the authors presented sample HS codes and rates assigned to those, these are just giving an idea of how big those percentages are. Next there is a table that presents all aspects that were needed to perform calculations.

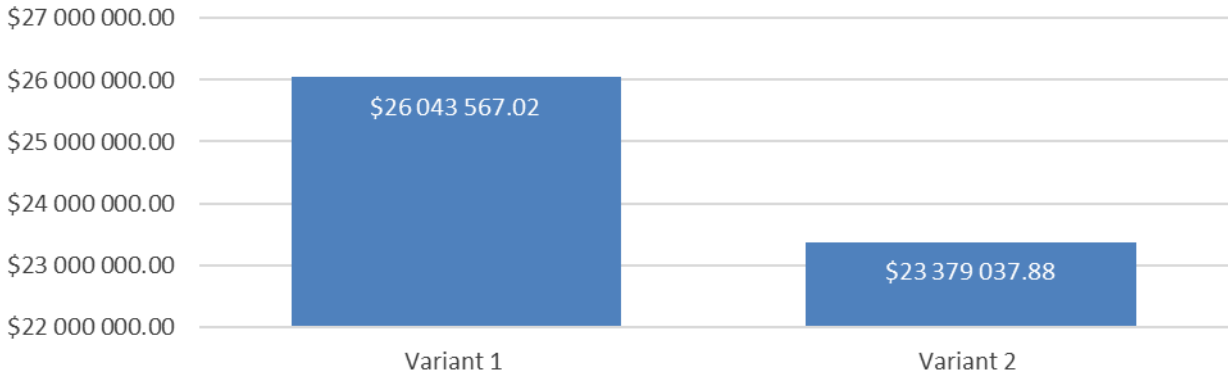
As can be seen, all aspects were used in the table below, starting with basic aspects like value and rate of VAT and ending with two variants of calculations.

Table 3: Calculations for admission to trade procedure (4000)

No.	Value	VAT	Rate	Certificate	Variant 1	Variant 2
1	$ 871,020.00	23%	2.70%	YES	$ 223,852.10	$ 200,334.60
2	$ 18,631.00	23%	2.70%	YES	$ 4,788.16	$ 4,285.13
3	$ 730,373.00	23%	2.70%	YES	$ 187,705.90	$ 167,985.80
4	$ 238,989.00	23%	2.70%	YES	$ 61,420.17	$ 54,967.47
5	$ 766,929.00	23%	2.70%	YES	$ 197,100.80	$ 176,393.70
6	$ 544,822.00	23%	2.70%	YES	$ 140,019.30	$ 125,309.10
7	$ 978,909.00	23%	2.70%	YES	$ 251,579.60	$ 225,149.10
8	$ 666,380.00	23%	2.70%	YES	$ 171,259.70	$ 153,267.40
9	$ 171,559.00	23%	2.70%	YES	$ 44,090.66	$ 39,458.57
10	$ 309,447.00	23%	2.70%	NO	$ 79,527.88	$ 79,527.88
...	...	...	...	...	...	...
198	$ 391,935.00	23%	2.70%	YES	$ 100,727.30	$ 90,145.05
199	$ 864,236.00	23%	2.70%	YES	$ 222,108.70	$ 198,774.30
200	$ 393,885.00	23%	2.70%	YES	$ 101,228.40	$ 90,593.55
				SUM:	$ 26,043,567.00	$ 23,379,038.00

Source: Own work.

Figure 2: Comparison of values for variants no 1 & 2



Source: Own work.

As it can be seen very clearly, the amount of customs duties to be paid for variant no 1, that did not take availability of certificates under consideration, is much higher than value of duties with applied tariff suspension based on airworthiness certificates. After calculations, variant no 1 is actually higher by $2,664,529.14, that is a 10,2% difference. What we have to remember is that VAT usually can be settled, so those costs will be even lower. For an amount of 200 values this difference in duties to be paid is huge and may seriously impact finances of the company. It should be underlined that for a big company the number of deliveries in a month can be even bigger.

The second scenario to cover is inward processing, that might have even bigger impact on the saved resources. That is because, as stated in the first section, payment of duty and VAT is not needed in the case of inward processing procedure (Gwardzińska et al., 2017). Variant no 1 of the calculations looks completely the same as in the case of admission to trade. Customs duties are calculated as if no suspensions or special procedures were used, nothing changes, so the first column from the chart will remain the same. However, in the case of variant no 2, the situation is completely different. As explained before, in the case of inward processing the entity is not paying for duty or VAT be-

cause it is suspended, it only is placing the amount of duty that would have to be paid in the form of a guaranty. This money will be given back at the moment of export (Rymarczyk, 2017). The following analysis will contain three variables that will conclude with two variants, the first is variant no 1, then there is variant no 2 which is simply equal to 0 and last there is a position that will show the amount of money that would have to be placed under guaranty and later that would be given back. The last variable is shown only to visualize the situation, the formula for the last variable looks as follows:

$$Value * VAT\ 23\%\ or\ Value * VAT\ 23\%$$
$$+Value * Rate = Variant\ 1 \quad and \quad Variant\ 2 = 0 \quad (3)$$
$$Only\ in\ the\ case\ of\ \ no\ certificate : Value * Rate = Guarantee$$

Table 4: Data variables for simulation no 2: Inward processing (5100)

Variables	Characteristic
Value	Random value from range $ 1,000.00 - $ 1,000,000.00
VAT 23%	Amount of VAT to be paid
Rate	Rate of customs duty connected to given HS Code
Certificate	If certificate of airworthiness that allows us to apply 0% duty rate
Variant 1 (4000)	Amount of money to be paid if all materials were treated as admissioned to trade
Variant 2 (4000)	No payments needed
Guarantee	Shows amount of money that needs to be subtracted from the guarantee, no other payments

Source: Own work.

In the case of inward processing (5100) all payments are suspended. If there is a certificate that can be used, no additional steps are needed. But if there is no certificate then only the amount of duty should be taken from the guarantee. After export, the amount of duty will come back to the guarantee. All aspects can be seen, plus additional value for the guarantee.

Again, all aspects presented before are listed next to each other and then calculated in last three columns of the table: variant no 1, guarantee, variant no 2.

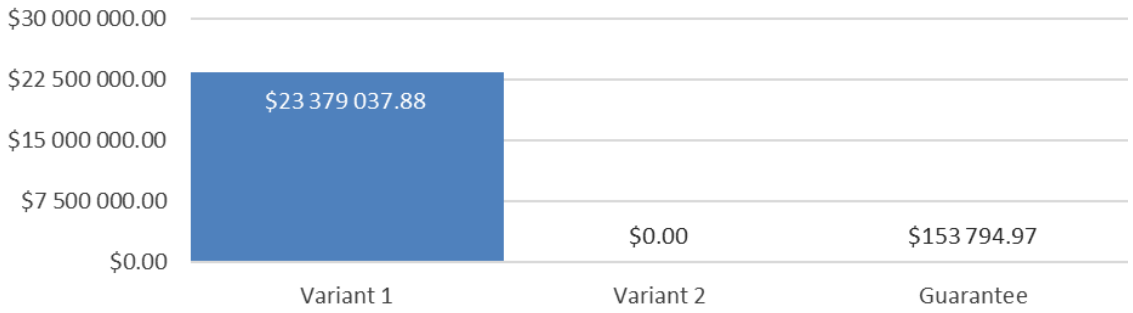
Table 5: Calculations for inward processing procedure (5100)

No.	Value	VAT	Rate	Certificate	Variant 1	Variant 2	Guarantee
1	$ 871,020.00	23%	2.70%	YES	$ 200,334.60	$ 0.00	$ 0.00
2	$ 18,631.00	23%	2.70%	YES	$ 4,285.13	$ 0.00	$ 0.00
3	$ 730,373.00	23%	2.70%	YES	$ 167,985.80	$ 0.00	$ 0.00
4	$ 238,989.00	23%	2.70%	YES	$ 54,967.47	$ 0.00	$ 0.00
5	$ 766,929.00	23%	2.70%	YES	$ 176,393.70	$ 0.00	$ 0.00
6	$ 544,822.00	23%	2.70%	YES	$ 125,309.10	$ 0.00	$ 0.00
7	$ 978,909.00	23%	2.70%	YES	$ 225,149.10	$ 0.00	$ 0.00
8	$ 666,380.00	23%	2.70%	YES	$ 153,267.40	$ 0.00	$ 0.00
9	$ 171,559.00	23%	2.70%	YES	$ 39,458.57	$ 0.00	$ 0.00
10	$ 309,447.00	23%	2.70%	NO	$ 79,527.88	$ 0.00	$8,355.07
...	...	...	...	...	...	...	...
198	$ 391,935.00	23%	2.70%	YES	$ 90,145.05	$ 0.00	$ 0.00
199	$ 864,236.00	23%	2.70%	YES	$ 198,774.30	$ 0.00	$ 0.00
200	$ 393,885.00	23%	2.70%	YES	$ 90,593.55	$ 0.00	$ 0.00
				SUM:	$ 23,379,038.00	$ 0.00	$ 153,795.00

Source: Own work.

After the performed analysis, it can be clearly seen that costs that would have to be covered by the company in variant no 1 are the same as in case of variant no 1 in previous calculations. However, costs in the case of variant no 2 are completely different because those are equal to $ 0. The last step is the guarantee value that is equal to $ 153,794.97 but it should be underlined once again that this amount is not lost, only temporarily frozen. Those possible savings are huge and would provide a tremendous help for any company not only those connected with maintenance of aircrafts.

Figure 3: Comparison of values for variants no 1 & 2 and customs guarantee



Source: Own work.

The last scenario to cover is admission to trade after outward processing. In this case there is one more factor to be taken under consideration in this research and that is value of repair that sent material went under in the outside vendor facility. As a reminder, customs duties in the case of outward processing procedure are calculated based only on value of repair since value of material is not added into calculations (Rymarczyk, 2017, pp. 320-321). Again, variant no 1 will be a bit different, due to the fact of additional cost of repair. That is why the formula also had to be changed a bit, now it looks as follows:

$$(Value + Value\ of\ \ repair) * VAT\ 23\% = Variant\ 1 \quad (4)$$

Variant no 2 for the calculations will be focused only on value of repair, value of the materials is subtracted because this is material that already belongs to the company. Besides 23% of VAT that has to be paid there is still duty to be paid. Duty is calculated from added value of repair[30]. However, aviation MRO have possibility to use those special preferences due to certificates so usually value of duty would be still equal to 0. If certificate for aircraft parts is not available, then duty rate is equal 2,7%[31].

$$(Value + Value\ of\ \ repair) * VAT\ 23\% + (Value + Value\ of\ \ repair) * Rate = Variant\ 2 \quad (5)$$

[30]https://puesc.gov.pl/documents/10180/19224/Instrukcja+wype%C5%82niania+zg%C5%82osze%C5%84%20AISIMPORT+AESECS2+NCTS2+wersja+2.0.pdf/27c6c55c-d28f-4d0f-86ef-eb835a017b94 (Accessed 30.04.2021).
[31]https://extisztar4.mf.gov.pl/taryfa_celna/Measure?cnCode=8411910090&country=&date=20210602&lang=PL&page=1 (Accessed 02.06.2021).

Table 6: Data variables for simulation no 3: Admission to trade after outward processing (6121)

Variables	Characteristic
Value	Random value from range $ 1,000.00 - $ 1,000,000.00
VAT 23%	Amount of VAT to be paid
Rate	Rate of customs duty connected to given HS Code
Certificate	If certificate of airworthiness that allows us to apply 0% duty rate
Value + value of repair	If certificate of airworthiness that allows us to apply 0% duty rate
Variant 1 (6121)	What would happen if all materials were treated as they are once again admissioned to trade
Variant 2 (6121)	What would happen if outward processing was used and customs duty was calculated only on the basis of value of repair

Source: Own work.

Admission to trade after outward processing in the case of this procedure. Customs duty is generated from the value of repair. Table above presents all necessary aspects to take into consideration for simulated calculations.

All aspects listed present as below, this simulation required the greatest number of calculations to perform. Also, each simulation has summed up values for variant no 1 and no 2 that later were used for making the graphs.

Table 7: Calculations for admission to trade after outward processing procedure (6121)

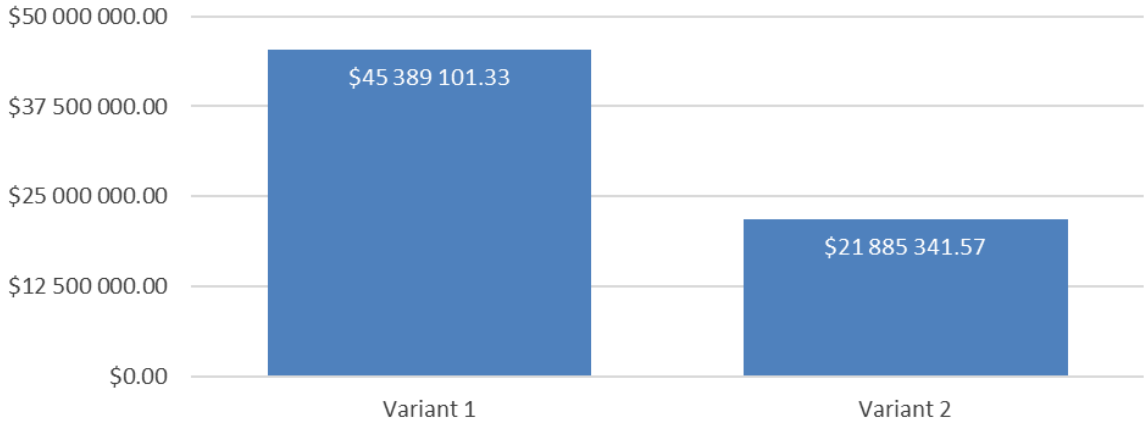
No.	Value	Value of repair	Value + value of repair	VAT	RATE	Variant 1	Variant 2
1	$ 871,020.00	$ 238,989.00	$ 1,110,009.00	23%	2.70%	$ 255,302.07	$ 54,967.47
2	$ 18,631.00	$ 420,360.00	$ 438,991.00	23%	2.70%	$ 100,967.93	$ 96,682.80
3	$ 730,373.00	$ 682,566.00	$ 1,412,939.00	23%	2.70%	$ 324,975.97	$ 156,990.18
4	$ 238,989.00	$ 379,258.00	$ 618,247.00	23%	2.70%	$ 142,196.81	$ 87,229.34
5	$ 766,929.00	$ 417,763.00	$ 1,184,692.00	23%	2.70%	$ 272,479.16	$ 96,085.49
6	$ 544,822.00	$ 774,065.00	$ 1,318,887.00	23%	2.70%	$ 303,344.01	$ 178,034.95
7	$ 978,909.00	$ 401,845.00	$ 1,380,754.00	23%	2.70%	$ 317,573.42	$ 92,424.35
8	$ 666,380.00	$ 135,010.00	$ 801,390.00	23%	2.70%	$ 184,319.70	$ 31,052.30
9	$ 171,559.00	$447,655.00	$ 619,214.00	23%	2.70%	$ 142,419.22	$ 102,960.65
10	$ 309,447.00	$ 28,566.00	$ 338,013.00	23%	2.70%	$ 86,869.34	$ 6,570.18
...	...	...	...	...	...	...	...
200	$ 393,885.00	$ 458,317.00	$ 852,202.00	23%	2.70%	$ 196,006.46	$ 105,412.91
						$ 45,389,101.33	$ 21,885,341.57

Source: Own work.

As can be clearly seen, the difference is tremendous, it is equal to $ 23,503,759.76 which is above the 50% mark. It might be due to the fact that repair is much less expensive than a new part, if the cost was similar or the same nobody would bother to repair. By usage of used parts and repair of them, companies are minimizing costs that could be generated due to buying only new parts. In conclusion, if this cost can be minimized even more, admission to trade after outward processing is the way to do it, of course only if parts have free circulation status. This proves again that usage of special customs procedures makes a significant difference for finances of the company.

Analysis performed in the previous part of the paper has shown many possibilities for MRO companies in the aviation industry. To round off the whole analysis, the authors will present a graph that shows gathered together all saved costs for the three procedures, and will conclude with the findings based on the research. This will provide a suitable closure of the article.

Figure 4: Comparison of calculations outcomes resulting from variant 1 & 2



Source: Own work.

First, opportunities connected to usage of certificates of airworthiness undoubtedly give a huge advantage for the company. Those are useful in all three variants of this research: admission to trade, inward processing and admission to trade after outward processing. In all three aspects tariff suspension based on certificates are the reason for savings, in the case of admission to trade and admission to trade after outward processing it cuts duty liabilities, and in the case of inward processing it simply is not forcing the company to use a guaranty or to apply for a one-use guaranty. In the authors opinion if the company has a lot of material turnover with non-EU countries, airworthiness certificates are essential for highly efficient operation. In conclusion if both scenarios would have to be compared, the second one with application of certificates without a doubt is more profitable for an aviation-based MRO company.

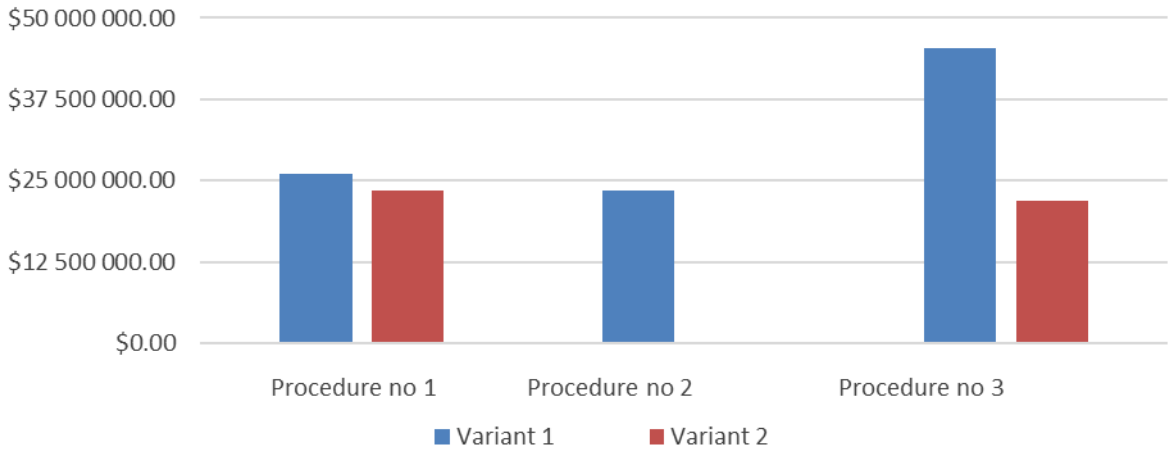
The second investigation is the inward processing special procedure. Except from the fact that inward processing gives an opportunity to perform maintenance on non-EU machines, as stated before, it also gives an opportunity to suspend all liabilities. Overall, this procedure looks the most effective due to zero connected costs. Differently than in the case of admission to trade and admission to trade after outward processing, even VAT payment is suspended. This is possible due to a special declaration of no arrears in the payment of taxes confirmed by the Customs and Tax Office[32]. Even though inward processing requires authorization from Customs Authorities it might still be worth it to investigate all possibilities.

[32]Act of July 7, 2020, Announcement of the Marshal of the Sejm of the Republic of Poland on the publication of a uniform text of the Act - Tax Ordinance (Journal of Laws 2020, item 1325).

Last but not least is admission to trade after outward processing which is the most complicated procedure of all because it requires a lot of activities as mentioned in sections one and two. As shown previously it also could bring a lot of savings, of course it would be easier to use services from companies located in the EU. However, unfortunately it is usually not possible especially in the case of aviation. That matter was also covered previously in the article. So, if it is not possible to avoid such situations the company has to learn how to deal with it. As shown on the graph when two scenarios of approaches are being compared, Variant no 2 looks much better from the financial point of view.

It could be argued that those calculations are too simple, that those do not take every possible alternative under consideration, and it is true. For example, in the case of admission to trade after outward processing there is a possibility that value of repair might be equal to zero due to warranty or any other obligations of the manufacturer. However, those were not meant to perform very complicated and exact financial analysis. Those were meant to show the overall situation, possibilities and more or less the financial savings, to show that there might be a different way of action or another approach that might open up new doors for the company. If those possibilities will be taken advantage of or if there is a need for those solutions, depends on the company and their percentage of different procedures in day-to-day operation. Each entity has to decide based on their business characteristics and needs. Maybe even one of those solutions will be enough to facilitate growth of the company in the international market as well as to help with the firm's financial situation.

Figure 5: Comparative analysis of obtained results for all three scenarios



Source: Own work.

It is difficult to show any practice because the customs strategy is something that companies do not share so easily, it is understandable since it contains a lot of sensitive data like finances, material flow within the company, and authorizations as well as flaws of the whole system that should not be easy to find out either by competitor or customs authorities. Also, those solutions presented have some limitations. First of all, customs are a very complicated issue that requires a lot of knowledge and experience in this field. Secondly, it could be that the operation in the way proposed by the author and getting all authorizations and other necessary documents to fulfill requirements of customs office will be extremely expensive. Thirdly, customs affect material flow in the whole company, such a big MRO or manufacturing company for sure will need a program like SAP[33] to coordinate material flow so that every part under customs control could be easily found by request of the customs office. One tip that the author can give is to use services of companies that work in the field of customs and tax consultancy. An example of such a company is Deloitte, which between many different services offers also help for companies in the customs field[34]. It may be hard for a new company or one that is just starting to know what customs is all about to start getting into the topic. With the help of such companies, it may be easier. Also, they are always very well informed, sometimes it is hard to keep up with changes so an additional pair of eyes is always valued. Overall, the author has shown and proved that customs procedures and other facilitations can remarkably change finances connected to import of parts or whole engines or aircrafts onto the territory of the European Union.

Conclusions

In the author' opinion the research done throughout the article was highly effective due to the type of research applied and very straight forward results obtained by it, which cannot be undermined. However, let's start with the theoretical part that laid the foundations for further analysis of the issue. Starting with the inward processing procedure, to sum up it creates great opportunities for companies that use goods imported from outside of the Union customs territory to carry out repairs, preservations or who simply do not know at the time if the finished product will be sold in a third country or not. It requires a certain type of authorizations and possibly support from the Customs Agency. Next there is the outward processing procedure that has a few main points: designed to give businesses the possibility to take advantage of benefits such as lower labor costs or specific technical expertise in non-EU countries, allows businesses to place Union goods under processing operations that are not available in the European Union; in European Union countries we can often observe a lack of sophisticated, highly-developed and unique technologies available in countries like the USA, Switzerland or Japan.

Following that, there are suspensions: suspensions allow us to skip additional costs of inward processing, outward processing or end use for parts that will be later used in the process of repair of an aircraft or engine alone. The case of art. 324 is unfortunately lost, because of the fact that practical use of this solution is almost impossible due to very high costs as explained in section one.

In the second section the authors underlined the importance of calculations and awareness of how cost generating MRO business is, especially in the case of aviation. Then there was an extensive analysis of how customs procedures and other facilitations might be used in MRO business, how those affect various situations that might happen in such a company. The last issue covered in the second section are factors justifying usage of special customs procedures where the authors carefully analyzed highs and downfalls of usage. The authors also touched on the topic of how beneficial it can be for an aviation MRO to invest in customs. However, another important topic are dangers that might fall onto the company if it will neglect customs law, this was also covered in second section.

Last but not least, the third section started with analysis of the methodology used in the whole paper with division offer the theoretical part and practical part. Next the main research was conducted in the form of analysis of results obtained from simulation. The authors presented three scenarios of calculations for each procedure: admission to trade (4000), inward processing procedure (5100) and admission to trade after outward processing (6121). Each scenario was continued with a short analysis that showed great results that could be obtained by usage of customs procedures. All conclusions were later summed up in the

[33] https://www.sap.com/poland/why-sap.html?campaigncode=CRM-PL21-PPC-NSPBRAB&source=ppc-meepl%20-GOO-299289745---&DFA=1&gclid=CjwKCAjwt8uGBhBAEiwAayu_9T5yhGsR9TFS-uTE-jz106EnZKnMd1z9hZaa6QEJyD-4zKTLQxKx8BoCprEQAvD_BwE&gclsrc=aw.ds (Accessed 23.06.2021).
[34] https://www2.deloitte.com/pl/pl/pages/tax/solutions/clo.html (Accessed 23.06.2021).

last section where the authors explained financial results presented on charts and all-important information about procedures. The results show a great difference between variants when only admission to trade was used, which is the most basic procedure, and when more sophisticated solutions were applied. As expected by the authors, the difference was in favor of application of special customs procedures and tariff suspension. However, it should be underlined that those are results obtained from a simulated database. Every company that is considering application of such solutions should perform analysis based on actual financial data coming from their company, due to the fact that a simulated database will not show the actual situation of the company. It is just an example of how costs and savings can change. All of that is an answer to the first research question formulated in the Introduction. Actual mitigation of costs connected to operations is possible due to application of special customs procedures and other facilitations. The answer to the second question about the amount can be conducted based on the research and results analysis part where all financial analysis are presented. Those show a huge impact and impressive financial results.

In a nutshell, the research touched on theoretical topics as well as brief practical analysis. It showed many possibilities for changes and generating savings as well as a compact explanation of how the process looks. Possibilities were shown as well as explanation of why it is even worthing on customs within the company, followed by practical research showing possible percentages of savings. Most importantly, the paper fulfilled the assumptions made in the article's aim.

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