Development of a framework for improving the turnaround time of the application process at the South African Civil Aviation Authority

Quintin Mokoena*, Ilesanmi Daniyan, Khumbulani Mpofu, Oluwayemisi Abisuga

Department of Industrial Engineering, Tshwane University of Technology, Pretoria, South Africa

ARTICLE INFO

Keywords: Drones Framework Process improvement Turnaround time

ABSTRACT

Drones are considered to become more significant as technology develops and be used in creative ways. The aim of this paper is to develop a framework to improve the turnaround time (TAT) of the drone application process at South African Civil Aviation Authority (SACAA). According to some of the drone companies, application process of drone approval takes time to complete. These delays impact negatively to drone companies in South Africa. Drone operators were interviewed, and the current status of the application process was captured. Thirteen drone operators were interviewed using a structured set of questionnaires. Results show that application process is not well implemented and that the structure does not create a positive outcome to the South African drone industry. Findings indicate that the average turnaround time to complete the approval process is long, and it is time consuming. The framework to improve the current turnaround time of the application process was developed. The proposed framework consists of three techniques (process activities improvement, capacity enhancement and process redesign). The proposed framework can be used as a guide to improve the situation at SACAA.

1. Introduction

The use of drones is growing around the world, including South Africa. Drones are also referred to as an Unmanned Aircraft Systems (UAS), Unmanned Aerial Vehicles (UAVs) or Remotely Piloted Aircraft Systems (RPAS). Various sectors such as mining, filming and media, security, construction, and others are starting to use drone technology in their services. Drones are poised to become even more significant as technology evolves and applied in a creative way (Fernandez, 2016). In South Africa, SACAA is mandated to regulate drones. The regulation was gazetted in May 2015, Eighth amendment of the Civil Aviation Regulations, Part 101: Remotely Piloted Aircraft Systems, under Civil Aviation Act, 2009 (Act No 13. of 2009). Since drones are the developing technology, the need to fully monitor and control these devices is very crucial to prevent hazards and protect the safety and privacy of the South Africans. Drone companies with drone operators are the stakeholders in the SACAA’s drone approval process.

The view by Lawrenson and de Oliveira (2018) is that it is difficult to anticipate how the SACAA will enforce compliance due to restrictive regulations. A lot of companies want to enter the drone industry and benefit from the drone technology. Therefore, this has led to a lot of applications for drone commercial operations being submitted at SACAA and had caused a bottleneck regarding issuing of approvals. The report by Lawrenson and de Oliveira (2018) indicate that the use of drones is slowly increasing and is expected to be in the skies with huge numbers in the future. The high number of applications that SACAA receives, indicate that South Africa will soon demonstrate the use of drones and its technology. It has been reported that SACAA is struggling to keep up with a pace of drone approval submissions. This has led to most of the drone companies raising concerns regarding the time taken to complete the drone approval process (Emma-Iwuoha, 2018).

According to Kuschke and Cassim (2019), the application process for drone approval in South Africa is too time consuming. In support, Charles (2020) also reported that SACAA takes too long to complete the drone approval process. Reitz (2018), Chief Executive Officer (CEO) of United Drones Holdings in an interview stated that there are thousands of drone operators in Australia and Europe compared to South Africa which had 32 drone operators with RPAS Operators Certificate (ROC). In South Africa, commercial drone operators are required to complete all the steps that are required for ROC issuance. Drone industry in South Africa have concerns regarding the TAT because is too long and it affects the drone industry financially. In 2017, SACAA representative confirmed that TAT...
for those who have submitted the correct documents would be 90 days (Katzenellenbogen, 2017). SACAA is not meeting the specified timelines to ensure customer satisfaction.

Since the TAT is not good, as indicated by some of the mentioned authors in this study, the need to improve the turnaround time at SACAA is vital. The paper developed a framework to assist in the elimination of the application process bottlenecks and delays. The purpose of this paper is to develop a framework to improve the turnaround time at SACAA. The framework will be used as a guide to improve the existing situation. This paper will contribute to the drone technology approval processes, since the papers in drone technology field are still developing in South Africa.

According to Kim (2017), drones can be used in various sectors because of its excellent flexibility, especially where humans cannot reach. The author further states that there is a need to use drones to improve business capabilities in industries. Kellermann et al. (2020), believe that drones have proved that they have capability to become one of the best technologies of the 21st century. Other countries are already benefiting with the use of drones while South Africa is still experiencing difficulties with the effective implementation. Sandvik (2015), explains that drone operators are viewed as the solution to the challenges of poor health, poverty, and African countries that are underdeveloped.

The report by IndustryArc (2019), found that small drone’s market in South Africa is estimated to reach $134.5 million by 2025. Commercial drones in South Africa would create jobs in security, agriculture, surveillance, and construction. In the latest Covid-19 crisis drones have proved to be best technology device to be used in areas such as sanitizing process (IndustryArc, 2019). Game reserves, acting industry, agriculture industry, and other sectors are starting to recognise drones as a future technology to assist in their spaces.

In construction sectors, drones provide solutions to projects by capturing images and recordings of the work in progress. DroneVisuals (2019) assertion is that the generated data by drones can be used for planning, to view constructions in progress onsite for updates, analysis, site progress monitoring, and inspection in projects.

In agriculture, drones are used for monitoring, planting, and capturing of images. According to DroneVisual (2019), drones are applied in capturing images which allows for a multi-spectral view of the crops for application in farms, monitoring of crop growth and crop health analysis. According to Ayamga et al. (2020), in agriculture drones are used for real-time monitoring to minimise the need to walk through the farm and reduce cost.

Tsiamis et al. (2019), argue that the use of drones has led to serious problems that authorities and regulators will need to address as the drone technology continues to evolve. According to Drone Council South Africa (2020), the TAT at SACAA is a major obstacle to drone industry development. Software development of drone technology delays commercial drone regulatory processes due to continuous change in the technology (Ayamga et al., 2020).

Commercial, corporate, and non-profit drone operators are required to additionally apply for ROC including the operation specifications. The ROC process involves five phases of certification process which are pre-application, formal application, documentation evaluation, demonstration, and certification. In most cases, processes are modelled using flow charts. Tricker (2014) argues that in each process in the flowchart, there should be an organisational document detailing objective, scope, responsible owner, policy, and key performance indicators.

Table 1 indicates the type of operations together with the required approvals in order to operate drones in South Africa.

For commercial purposes, drone operators are required to comply with all approvals as indicated in Table 1. Corporate and non-profit users do not require ASL approval. Private users do not require approval of SACAA but need to follow sub-part 5 (RPA operations) of the Part 101: regulation which states the conditions of operations and restrictions.

Turnaround time is a time taken from when a service starts up to until it is complete. Effective TAT allows the processes to move smoothly as well as meeting customer needs in terms of getting service within acceptable lead time. Quick TAT helps to reduce high volume of work in process in a market (Martin, 1993). Effective TAT improves productivity and reduces workload at an organization. Study by Zelt et al. (2019) indicated that partial automation of process can efficiently help fast track and improve the process’s TAT. Automation helps to eliminate some of the unnecessary or exhausting tasks that leads to human error (De Feo, 2015).

Kim (2017) is of the view that in the Fourth Industrial Revolution, drones are crucial to convert the industry with the integration of Information Technology (IT). Safe operation of drone technology is being considered by most countries who adopted the use of commercial, private and recreation drones. Processes to approve and control drone technology differs per country, each country regulates what is appropriate and fit for their countries. Some of the countries including South Africa are still struggling with the processes due to the regulations that have been enforced, which creates barriers to more participation of drone industry.

Kim (2017) expresses the view that drone technology is expanding at a fast rate. It is therefore important to implement processes that will ensure quick TAT in issuance of approvals.

TAT is very vital in any process to increase productivity. According to Martin (1993), to fit well and be competitive in a market, low cost and fast turnaround time is a requirement. The author further states that good TAT provides quick reaction to customer needs, and it assists to reduce the existing work in a pipeline or process. It is important to provide a process with effective timelines to estimate the completion of a process.

Tricker (2014) argues that human resources include assigning of personnel who are competent, educated, trained, skilled and experienced. Blokland et al. (2009) hold the view that capacity development is important in any process, and in most cases, it is the conditions that makes development possible. In support of these authors, capacity is a tool that includes human resource, materials, and capital. In addition, capacity is one of the tools that can delay a progress when it is not sufficient in completing a specific activity or a process.

Furthermore, Blokland et al. (2009) believe that capacity enhancement involves more than the development of individual skills and abilities, because competent people need a suitable environment, opportunities, benefits and to be motivated. Therefore, it is crucial to assess the SACAA’s capacity in issuing the approvals of commercial drones to check if it impacts the turnaround time. In support of these assertions, vom Brocke et al. (2016), view is that it is crucial for processes that includes core processes to offer opportunities for customer satisfaction. Resource management is essential for business effectiveness. Foster (2013) argue that resources should be used to maintain Quality Management System (QMS) and customer’s requirements, including training of personnel.

Vom Brocke et al. (2016) further state that Business Process Management (BPM) can only be implemented successfully in a situation where an organization delivers required resources like personnel and investments in Information Technology fulfilment.

| Required approval | Type of operations | Commercial | Corporate | Non-profit | Private |
|-------------------|-------------------|------------|-----------|------------|---------|
| ASL               | ✓                 | ✓          | ✓         | ✓          | N/A     |
| ROC               | ✓                 | ✓          | ✓         | ✓          | N/A     |
| RLA               | ✓                 | ✓          | ✓         | ✓          | N/A     |
| RPL               | ✓                 | ✓          | ✓         | ✓          | N/A     |
| CoR               | ✓                 | ✓          | ✓         | ✓          | N/A     |

ASL – Air Service License. ROC – RPAS Operator Certificate. RLA – RPAS Letter of Approval. RPL – Remote Pilot’s License. CoR – Certificate of Registration. (South African Civil Aviation Authority, 2015).
Continual process improvement is very important in an organisation. Tricker (2010) defines continuous improvement as a need for organisation to focus on the effectiveness and efficiency of business processes while conforming to organisational policies and objectives. According to De Feo (2015), the organisation dies when there is no continual improvement. It is therefore crucial to maintain continual improvement in an organisation. According to Dumas et al. (2013), process improvement helps to identify issues identified during process analysis and develop strategies to address them to meet the goal of the process.

2. Methodology

This paper seeks to develop the framework to improve the lead time of the application process at SACAA. Qualitative approach was used to collect data by conducting interviews with drone operators that are already SACAA approved. Quota sampling approach was used because it includes the associated population necessary to gain insights about the study (Mack, 2005). Email requests were sent to drone companies to participate. 13 out of 65 drone companies agreed to participate in the interviews by answering the structured questions. These participants represent 20% of the SACAA approved RPAS Operator’s Certificate holders (drone companies). The view of Whitehead and Whitehead (2016:114) is that a common range for sample size is between 8 to 20 participants, but where possible can also be within or outside of the mentioned range.

Table 2 shows the participants’ working environment for commercial operations.

Some of the participants stated that they operated commercial operation for data analytics, agriculture, mapping, media, and photography. However, the majority of the participants have conducted commercial drone operation in surveying and filming industries. Some of the participants stated that they operated commercial operation for data analytics, agriculture, mapping, media, and photography. The report by Botha (2018), is that commercial drones in South Africa would create jobs in security, agriculture, surveillance, construction. SACAA representative confirmed that the use of commercial drones has started to show a huge success in various sectors such as construction, agricultural, mining, forestry, and insurance (Jackson, 2016).

3. Results and discussion

This section discussed the results of the interviews regarding the overall process of the approval.

3.1. Drone operators’ perception regarding the drone approval process

a) Application process steps

Figure 1 presents the perception of the participants regarding the application process. 30% believed that the current approval process is well implemented. The opinion of P2, P3 and P11 is that it is a good structure for the drone application process in South Africa. 46% were of the view that the application process is poorly implemented. Participants stated that it is poorly implemented because the process had administration issues, favoured companies with access to working capital, and that there is a lack of resources. 15% were neutral meaning that the approval process is neither well implemented nor poorly implemented but one participant further stated that it is a conservative and a relevant process. The results suggest that most of the participants do not support the notion that the South African drone application process is well implemented. This implies that the growth of drone technology in South Africa is at risk of lagging behind compared to other countries.

b) Longest application process phase

Figure 2 presents the duration of the longest application process phase. 42% stated that ASL is a step that takes time to complete. 34% experienced the ROC step approval as the one that takes longer to approve. P9 explained that it took a year to receive ASL and another year to receive ROC. From the remaining, 25% of the participants and P3 mentioned that all steps take time and P11 was not sure which step takes longer. The majority of the participants have experienced ASL step and ROC as the longest application phase. ASL step is done at DoT, which is independent to SACAA, and it impacts the SACAA’s process because it is required for the ROC approval. Therefore, the results show that it is difficult for the drone industry to trust the drone approval process.

c) Shortest application process phase

Figure 3 presents the views of the participants regarding the shortest application process phase. 68% of the participants mentioned that there is no shortest step in the drone application process. P4, P5 and P6 think that all phases take too long. The remaining 32% stated own experiences respectively. P1 mentioned that it is during the Letter of Intent stage. P9 believed that it is the CoR stage. P11 was not certain which step is the shortest during the application process. The majority of the participants believed that there is no shortest stage of the application process, meaning all the application process steps take time.

d) Value-adding steps to the application process

Figure 4 shows the view by participants about value-adding steps. 33% indicated that all the steps are necessary in the drone application process. P1 believed the steps are there to create a structure and P7 mentioned that it is a good setup for the South African drone industry. 67% indicated that not all the steps add value to the drone application process. P2 stated that some of the steps are bit too much for drone regulation and they should make it simple for the drone industry.

The participants who supported the steps mentioned that steps are there to create structure and it is very broad. The majority of the participants mentioned that some of steps are unnecessary, and they are leaning a lot towards the manned aircraft regulation.

e) Non-adding value steps to the application process

Figure 5 presents the non-adding value steps to the application process.
36% indicated that ASL step is not adding value. P4, P6 and P9 stated that ASL step is unnecessary, complicated and should be removed from the drone application process section because it is a DoT section. 9% mentioned that it is the Dangerous Goods & Aviation Security phase due to its intense security protocols and training. 36% of the participants stated that it is a re-demonstration of the similar aircraft for the issuance of the RLA.

19% believed that all phases add value to the drone application process. Most of the participants stated that it is an ASL and RLA steps, meaning that these two steps should be re-visited to enhance the drone application approval process. Steps that are not adding value tend to delay the process or affect the effectiveness of the process.

f) Negative impact due to SACAA turnaround time

Figure 6 indicates the negative impact to participants due to turnaround time.

All the participants (100%) interviewed stated that the approval process TAT has previously impacted negatively to their businesses. Most of the participants mentioned that have suffered financially because of
the poor TAT. P8 had few drones that are currently waiting for approval and further stated that drone technology changes very quick, therefore, it is important to have an effective process. Results show that there are financial implications due to TAT at SACAA and DoT. These results contribute to research question about the application process turnaround at SACAA.

g) Estimated turnaround time for all five approvals

Table 3 shows the number of months taken to complete each approval. P1 indicates that the approval was pending at the time of the interview, and the other numbers represent number of months. The average months for ASL is 8, ROC is 20, RLA is 8, RPL is 3, and CoR is 1. The results show that the average month for ROC takes longer to approve compared to other approvals. ASL and RLA average number of months for approval is 8 months, which also indicates that the TAT is still longer. RPL has an average of 3 months, and CoR has an average of 1 month which indicates better TAT.

h) Capacity to handle the application process

Figure 7 shows the view regarding the capacity to handle the incoming applications. 8% of the participants mentioned that SACAA has enough capacity but reinforce is needed. 92% of the participant disagreed that there is enough capacity to handle the incoming applications. From the results it can been clearly seen that the capacity is not enough to handle the drone approval process. Based on the evidence, the applications may keep piling up because there is not sufficient staff to handle the submissions.

3.2. Discussion of results

Perception regarding the TAT is that drone application process lead time is poor. The findings have revealed that the three months TAT as stated by SACAA is not met. The average time to complete the ROC process was 20 months. All participants have previously experienced delays while waiting for the drone approval from SACAA. Most of the participants had previously financially impacted due to the TAT because

![Figure 4. Value-adding steps.](image)

![Figure 5. Non-adding value steps.](image)

![Figure 6. Negative impact due to turnaround time.](image)
it takes too long. DoT also contribute to SACAA’s poor performance, because SACAA depends on ASL from the DoT on the issuance of ROC. It is therefore evident that application process improvement is needed at SACAA to reduce the bottleneck and workload.

3.3. Strategies for the improvement of turnaround time

Data gathered from the analysis indicates that there is a need to improve the time taken to complete the drone approval process. It was found that the lead time should be improved to meet 3 months TAT as set by SACAA. 3 months TAT may increase the number of ROC holders for commercial drone operations in South Africa. The opinion of the Commercial Unmanned Aircraft Association of Southern Africa (2019) is that the TAT with a duration of 3 months can grow the drone industry. Inadequate number of inspection personnel have affected SACAA to fully carry out their inspections and other activities which have impacted the drone industry growth (CUAASA, 2019). It was identified from the outcome of the survey that the training of SACAA’s inspectors should be prioritised to improve competency. CUAASA (2019) also believes that the required skills to conduct the drone approval process at SACAA is not enough.

It was discovered from the survey that some of the steps should be eliminated to fast track the process. Dumas et al. (2013) explain that unnecessary steps can be eliminated by integrating technology. According to the analysis from the survey, the validity period of the ROC is short. The analysis shows that validity period of ROCs should be extended by at least 24 months to avoid renewals of every 12 months which is also contributes to backlogs at SACAA. Extending ROC validity duration may reduce the bottlenecks and allow ROC holders to renew every 24 months.

Figure 8 shows the recommended strategies for the improvement of the turnaround time as discussed in this section.

3.4. Recommended framework for the improvement of turnaround time

a) Process activities improvement

Dumas et al. (2013) explain that process identification should be described in detail, and business problem should be addressed in order to come up with an updated process structure. This means that it is essential to conduct process analysis and goals definition for a process. The outcome of the survey indicates that process analysis should be conducted at SACAA to determine factors affecting the process. Process analysis may assist SACAA to determine where there are gaps in a process, and thereafter, come up with remedies for improvement.

According to Martin (1993) quick TAT helps to reduce bottlenecks in a process. The author further states that quick TAT should be competitive in a process. There are various methods that can be used to improve the TAT. Introduction of technology is one of the methods that can assist in improving TAT and process productivity. Sujova and Marcinekova (2015) stated that the use of technology that supports the market needs are essential for the process improvements. Chalmeta (2006) explains that organisations have benefited from technology integration to achieve

| Participant | ASL (Month) | ROC (Month) | RLA (Month) | RPL (Month) | CoFR (Month) |
|-------------|-------------|-------------|-------------|-------------|--------------|
| P1          | 8           | 7           | 3           | P           | 1            |
| P2          | 9           | 18          | P           | 1           |              |
| P4          | 4           | 18          | 6           | 2           | 1            |
| P6          | 8           | 18          | 4           | 1           |              |
| P7          | 8           | 6           | 6           | 1           |              |
| P8          | 6           | 8           | P           | 2           | P            |
| P9          | 12          | 24          | 3           | 1           |              |
| P10         | P           | 24          | 18          | 2           |              |
| P11         | 6           | 12          | 6           | 1           |              |
| P12         | 16          | 34          | 24          | 18          | 1            |
| P13         | 3           | 48          | 2           | P           | 2            |
| Total       | 80          | 217         | 72          | 29          | 11           |
| Average     | 8           | 20          | 8           | 3           | 1            |

Figure 7. Capacity to handle application process.
high efficiency in their daily activities. The introduction of technology in a process may improve productivity. Thus, the integration of partial automation and digitisation of some of the steps may assist SACAA to minimize the time taken to complete drone approval process. The expert’s opinion from the survey indicates that technology integration at SACAA should include conducting virtual inspections, assessments, hosting of one-on-one meeting, witness testing/flying instead of visiting the customer’s premises.

Dumas et al. (2013) explain that processes can be fast tracked by conducting some of the activities in parallel which can also be referred as parallelism. Parallelism allows companies to conduct process evaluation and select activities that can be executed in parallel. Parallelism technique may allow a company to assess the process and check whether some of the activities can be executed in parallel. The experts’ opinion from the survey also indicates that effective TAT can improve productivity and reduces workload in a process. The following are the recommended steps from the experts’ opinion with respect to process activities:

**Step 1**

- SACAA should conduct process analysis to determine which factors contribute to poor TAT.
- Unnecessary activities that are delaying the process efficiency should be identified and eliminated.
- SACAA should determine which steps can be improved by integrating information technology such as process automation and replacement of manual tasks where possible to fast track the process. This will allow reduction of paper work.
- SACAA should ensure that technology is used to help to digitise of some of the process activities where possible to help improve the TAT in a process.
- SACAA should determine which activities and tasks that can be executed in parallel. Reduction of tasks that depends on each other.

**b) Capacity enhancement**

It is important to pay special attention to activities in a process to reduce the TAT (Dumas et al., 2013). Furthermore, competency plays a vital role in ensuring good TAT. Epstein and Hundert (2002) assertion on competence is that it involves technical skills, capability, good reasoning, emotions, values, and reflection in daily practice. Reflection in daily practice may allow personnel to reflect on what has been done and improve where necessary. Education helps measure the assurance of the organisation in the development and maintenance of knowledge and process management skills (Rosemann and vom Broke, 2015). The outcome of the survey shows that the lack of capacity in humans, education, skills and knowledge contributes to delays in a process. The following are the recommended steps from the experts’ opinion with respect to capacity enhancement:

**Step 2**

- SACAA should enhance personnel knowledge and education to ensure sufficient capacity.
- Personnel should have skills and expertise to ensure smooth operation of the application process.
- SACAA should further prioritise training of drone inspectors to ensure effective discharge of responsibilities.
- Having additional personnel to help reduce the workload is also important.

**c) Process redesign**

Process redesign is one of the factors of process management that helps in process improvement. Process redesign is defined as a process of re-organising processes to make them perform better (Dumas et al., 2013). Process redesign or process improvement focuses on issues identified during the process analysis and make changes that would be able to resolve and improve the process (Dumas et al., 2013). Vom Brocke and Mendling (2017) state that processes should apply technology as a basis of process redesign.

Stakeholders should be involved in the operations of a process (Rosemann and vom Broke, 2015). The introduction of technology in a process may improve productivity. TAT with a duration of 3 months can grow the drone industry in South Africa (Commercial Unmanned Aircraft Association of Southern Africa, 2019). Therefore, process redesign may improve the current process to meet TAT of 3 months. This can be achieved by re-arranging of application process activities during redesign phase as well as checking which activities can be moved or removed. The following are the recommended steps from the experts’ opinion with respect to process redesign:

**Step 3**

- SACAA should ensure that proposed new changes to improve the TAT are implemented, including all stakeholders.
- Realistic timeline is key to ensure that a stated TAT is met.
- Change awareness and adaption of new changes should be prioritised.
- SACAA should continually control and monitor new changes to ensure conformance of the new changes.

Continuous improvement processes is essential to keep the implemented changes conform to the process goals (Daniyan et al., 2022).

---

*Figure 9. Proposed framework for turnaround time improvement.*
Therefore, after the implementation of proposed changes as per the identified steps (1–3), SACAA can ensure continuous process improvement by monitoring the application process and improve where required. It is crucial to continually improve the application process to identify and resolve deficiencies when occurred.

Figure 9 illustrates the proposed framework for the improvement of turnaround time of the application process at SACAA. The figure shows the recommended framework that SACAA can use as a guide to enhance the existing TAT issues.

As indicated in Figure 9, this can be done in sequence by starting with process activities improvement, capacity enhancement, and thereafter, the process should be redesigned to implement new changes for improvement.

4. Conclusion and recommendations

Research was conducted to investigate the turnaround time of the drone application process and to develop a framework for improvement. Drone operators were interviewed, and the current status of the application process was captured. Findings indicate that the turnaround time is long, and it is time consuming. The framework was developed and it indicates the strategies that can be used to improve the current turnaround time of the application process. The proposed framework consists of three techniques which are that process activities improvement, capacity enhancement and process redesign. This approach will help to reduce workload of the applications, ensure sufficient capacity with adequate technical skills and competency, and eliminate unnecessary steps in the application process. Adoption of this proposed framework can assist SACAA to reduce TAT and meet its objectives regarding the issuance of certificates and licenses as well as the improvement of the overall application process.

South Africa has been on the forefront of RPAS licenses and regulations, although the TAT needs to be reduced but the safety aspects cannot be ignored. The bottleneck appears to be the different departments that need to be contacted for the approval, with different documentation etc. SACAA can have in their offices people from the different departments to process documents faster, so that applications received can be processed and finalized.

Further recommendations are as follows:

- Consultation of quality techniques such as Business Process Management (BPM) models to analyse and improve the drone application process TAT.
- Removal of unnecessary application process steps for improvements and employ customer focus approach to meet customer needs.
- Increase productivity of ROCs by improving processes and resources, increasing capacity and by ensuring effective TAT.
- Realistic timelines should be set so that drone operators are aware of the duration of the application process that is acceptable.
- Improvement of TAT should be a continual process at SACAA in order to keep an effective TAT and customer satisfaction.

Future work can consider a comparative analysis with the application processes of other countries.

Declarations

Author contribution statement

Quintin Mokoena; Ilesanmi Afolabi Danjyan; Khumbulani Mpofu; Oluyawemisi Abisiga: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

No funding available for this work.

Data availability statement

No data was used for the research described in the article.

Declaration of interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

African Union, 2018, Baldwin et al., 2011, Braun et al., 2016, Clarke and Braun, 2017, Clifford et al., 2010, Creswell and Poth, 2007, Fine and Porteus, 1989, Fischer, 2019, House of Lords European Union Commit-tee, 2015, Ivosevic et al., 2015, Kothari, 2004, Nagiah, 2020, Ritchie et al., 2013, South African Bureau o f Standards, 2015, Stocker et al., 2017

References

African Union, 2018, Drones on the Horizon Transforming Africa’s Agriculture. [Online]. Available from: https://www.nepad.org/publication/drones-horizon-transforming-africas-agriculture, (Accessed 15 May 2021).
Ayangaa, M., Tekin-Dogan, B., Kassahun, A., Rambaldi, G., 2020. Developing a Policy Framework for Adoption and Management of Drones in Agriculture in Africa. Technology Analysis & Strategic Management. Taylor & Francis Group, pp. 1–18. Baldwin, R., Cave, M., Lodge, M., 2011. Understanding Regulation: Theory, Strategy, and Practice. Oxford University Press, New York.
Blokland, M., Alaric, G., Kaspern, J., Hare, M., 2020. Capacity Development for Improved Water Management. CRC Press, Delft.
Botha, R., 2018. Economic Impact of the SA drone industry—with reflections on the state of the macro-economy. [Online]. Available from: https://dronecou.za/wp-content/uploads/2018/05/DroneCou-2018-Dr-Reolof-Botha.pdf, 15/04/2020.
Braun, V., Clarke, V., Weate, P., 2016. Using thematic analysis in sport and exercise research. In: Routledge Handbook of Qualitative Research in Sport and Exercise. Routledge, London, pp. 191–205.
Chalmeta, R., 2006. Methodology for customer relationship management. J. Syst. Technology Analysis & Framework for Adoption and Management of Drones for Agriculture in Africa. (Accessed 20 October 2020).

Dumas, M., LA Rosa, M., Mendling, J., Reijers, H.A., 2013. Fundamentals of Business Process Management. Springer-Verlag, Berlin.
Dumais, M., LA Rosa, M., Mendling, J., Reijers, H.A., 2013. Fundamentals of Business Process Management. Springer-Verlag, Berlin.
Epstein, R.M., Hundert, E.M., 2002. Defining and assessing professional competence. JAMA 287 (2), 226–235.
Fernandez, P., 2016. Through the looking glass: envisioning new library technologies and employ customer focus approach to meet customer needs.

Dronevisuals, 2019. [Online]. Available from: https://www.dronevisuals.co.za/?gclid=CjwKCAjwwab7BRBAEiwA9pGTH2SwSpygDA2mjqNoY-AhSh5otw3pJeY wpUJmuv8r5chMTgloBcCVMQVAJl5W. (Accessed 20 September 2020).}

Drone Council South Africa, 2020. Drone Council South Africa Launch [Online]. Available from: https://www.youtube.com/watch?v=CjwKCAjwwab7BRBAEiwA9pGTH2SwSpygDA2mjqNoY-AhSh5otw3pJeY wpUJmuv8r5chMTgloBcCVMQVAJl5W. (Accessed 20 September 2020).}

Drone Council South Africa, 2020. Drone Council South Africa Launch [Online]. Available from: https://www.youtube.com/watch?v=spGdZiu7kA4&feature= --youtu.be. (Accessed 20 October 2020).

Dumas, M., LA Rosa, M., Mendling, J., Reijers, H.A., 2013. Fundamentals of Business Process Management. Springer-Verlag, Berlin.
Duma, M., LA Rosa, M., Mendling, J., Reijers, H.A., 2013. Fundamentals of Business Process Management. Springer-Verlag, Berlin.
Emma-Iwuoha, L., 2018. Drone law or regulations in South Africa | Get up to speed [Online]. Available from: https://www.michalsons.com/blog/drone-law-in-south-africa/16543. (Accessed 3 March 2020).

Drone visual, 2019. [Online]. Available from: https://www.dronevisuals.co.za/?gclid=CjwKCAjwwab7BRBAEiwA9pGTH2SwSpygDA2mjqNoY-AhSh5otw3pJeY wpUJmuv8r5chMTgloBcCVMQVAJl5W. (Accessed 20 September 2020).

Drone visual, 2019. [Online]. Available from: https://www.dronevisuals.co.za/?gclid=CjwKCAjwwab7BRBAEiwA9pGTH2SwSpygDA2mjqNoY-AhSh5otw3pJeY wpUJmuv8r5chMTgloBcCVMQVAJl5W. (Accessed 20 September 2020).

Drone visual, 2019. [Online]. Available from: https://www.dronevisuals.co.za/?gclid=CjwKCAjwwab7BRBAEiwA9pGTH2SwSpygDA2mjqNoY-AhSh5otw3pJeY wpUJmuv8r5chMTgloBcCVMQVAJl5W. (Accessed 20 September 2020).}
