A STUDY OF APPLICATION OF UNMANNED AERIAL SYSTEMS IN CONSTRUCTION PROJECTS

Final Project Report

as one of requirement to obtain S1 degree of

Universitas Atma Jaya Yogyakarta

By:

GREGORIUS EDWIN YONATHAN

NPM. : 13 13 15057

INTERNATIONAL CIVIL ENGINEERING PROGRAM

DEPARTMENT OF CIVIL ENGINEERING

FACULTY OF ENGINEERING

UNIVERSITAS ATMA JAYA YOGYAKARTA

YOGYAKARTA

2018

APPROVAL

Final Project

A STUDY OF APPLICATION OF UNMANNED AERIAL SYSTEMS IN CONSTRUCTION PROJECTS

By:

GREGORIUS EDWIN YONATHAN

13 13 15057

Has been approved

Yogyakarta, 23 July 2018

Supervisor,

(Ir. Peter F. Kaming, M.Eng., Ph.D)

Approved by:

Head of Civil Engineering Department,

UNIVERSITAS ATMA JAYA YOGYAKARTA
FAKULTAS TEKNIK

(Ir. AY. Harijanto S.,M.Eng., Ph.D)

STATEMENT

I signed below stating that the final project with title:

"A STUDY OF APPLICATION OF UNAMNNED AERIAL SYSTEMS IN CONSTRUCTION PROJECTS"

It is the result of my own work and not a result of plagiarism of other people's work. Ideas, research data, and quotes directly or directly derived from the writings or ideas of others expressly provided in this Final Project. If it is proved later that this Final Project is the result of plagiarism, which I get the certificate would be canceled and I will return to the Rector of Universitas Atma Jaya Yogyakarta.

Yogyakarta, 23 July 2018.

Who made the remarks,

Gregorius Edwin Yonathan

APPROVAL

Final Project

A STUDY OF APPLICATION OF UNMANNED AERIAL SYSTEMS IN CONSTRUCTION PROJECTS

By:

GREGORIUS EDWIN YONATHAN

13 13 15057

Has been approved

Yogyakarta,..23..July..2018.

Supervisor,

(Ir. Peter F. Kaming, M.Eng., Ph.D)

Approved by:

Head of Civil Engineering Department,

(Ir. AY. Harijanto S.,M.Eng., Ph.D)

APPROVAL EXAMINER

Final Project Report

A STUDY OF APPLICATION OF UNMANNED AERIAL SYSTEMS IN CONSTRUCTION PROJECTS

By:

GREGORIUS EDWIN YONATHAN

13 13 15057

Has been examined and approved by the examination committee

	Name	Signature	Date
Chairperson	: Ir. Peter F. Kaming, M.Eng., Ph.D		21/7/18
Member	: Ir. AY. Harijanto S.,M.Eng., Ph.D		23/07/18
Member	: Ir. A. Koesmargono, MCM, Ph.D		24/7/18

“Use your highest strengths and talents to belong to and serve something you believe is larger than the self”

(Martin E.P. Seligman)

“People who have meaning in their lives, in the form of clearly defined purpose, rated their satisfication with life higher”

(Emily Esfahni Smith)

“*There’s a theory that says that life is based on a competition and the struggle and the fight for survival, and it’s interesting because when you look at the fractal character of evolution, it’s totally different. It’s based on cooperation among the elements in the geometry and not competition*” (Bruce Lipton)

“Don’t wait until everything is just right. It will never be perfect. There will always be challenges, obstacles and less than perfect conditions. So what. Get started now. With each step you take, you will grow stronger and stronger, more and more skilled, more and more self-confident and more and more successful” (Mark Victor Hansen)

ACKNOWLEDGEMENTS

First and foremost, I would like to give thanks to my Lord Jesus Christ for all His blessings that given to me, so I can prepare and finish my final project report on time without any serious problem. The purpose of the final project with the title “A Study of Application of Unmanned Aerial Systems in Construction Projects” is to complete the requirement of undergraduate program (S-1) in International Civil Engineering Program, Department of Civil Engineering, Faculty of Engineering, Universitas Atma Jaya Yogyakarta. For the completion of this final project, I also would like to express my gratitude towards:

1. Sushardjanti Felasari, ST.,M.Sc.,CAED., P.hD., as the Dean of Engineering Faculty of Universitas Atma Jaya Yogyakarta,
2. Ir. AY. Harijanto S.,M.Eng., Ph.D., as the head of Civil Engineering Department of Universitas Atma Jaya Yogyakarta,
3. Johan Ardianto, S.T., M.Eng., as the Coordinator of International Civil Engineering Program,
4. Ir. Peter F. Kaming, M.Eng., Ph.D., as my supervisor final project for his advice and counseling. His constant support, sharing and advice have been invaluable,
5. Y. Lulie, Ir., M.T., as my Coordinator of International Civil Engineering Program 2013 and supervisor on-site practice for his advice and counseling. His constant support and advice to finished the report have been invaluable when i got accident last 2017.

6. Anastasia Yunika, S.T., M.Eng., as my Coordinator of International Civil Engineering Program 2014. Her constant support, counseling and advice as a program coordinator to assist me to keep study, be grateful, and be happy instead of get the bachelor engineering degree.
7. Dr. Eng. Luky Handoko, S.T., M.Eng., as the my Coordinator of International Civil Engineering Program 2016,
8. All the lecturers and staffs in the Civil Engineering Department, especially in International Civil Engineering Program,
9. My Parents, Johannes D. Kristianto, Ir., and F. Endang Sarawasih for the love, support, and advices to finish this final project,
10. My aunt Sylvia, uncle Danu, my cousin christien, kevin, marcel for their love and support.
11. My elder brother Bernard Teddy and Tommy Thomas give me motivation, new knowledge, rules, faithful, grateful in any situation.
12. To my special person Latri Tresnawati who always support, love, argue, help, motivate, take time and accompany from the beginning of the final project as well as providing encouragement and support to complete this Final Project.
13. To my brother from another mother Aris Putra Sadewo who always take time, chill, cook some beats, make some music and accompany from the beginning of the final project as well as providing encouragement and support to complete this Final Project.

14. My friends in ICEP batch 2013, Tiwi, Diko, Dea, Brenna, Alpin, Harry, Boas, Dinda who encouraging me and support me to finish this final project.
15. My senior and junior in ICEP , Ko Justi, Bli Eka, Kak Arnold, Abang Edgart, Dede Yona, Kevin J Sebastian, Agus Tobing, Patrick Dharmayasa, Adrian Bagoes, Anjuarti, Elsya Patresia, Andre Hartono, Tommy Tobing, Alvin Tresnohadi, Govinda Bendesa who encouraging me and support me when me still studying until now.
16. My senior who allways encouragement and give support since first semester Gabriel Chintya Hutahaean, Reinhard Tambunan, Wiranata Brian.
17. Explore Indonesia team, Rifky Anugrah, Odo Uun, Gerardo Gunawan, Steven Prakasa, Wahyu Dyatmika, Eva Lusiana Kleeman.
18. My friends All Night Long Project, Andhika Wibawa, Pandito Adinegara, Reynaldo Daniel, Indra Widjiarto for their time sing a long and support.
19. My friends 8sec Project, Arnanda Lucky, Editha Rahmawati, Felix Rio, Gandhi Bramayusa, for hardworking to this project in last years ago.
20. My friends Brewok PK and Doctor Cock Project, Jeremy Desmond and Hedwig for the time, hard working and encouraging in past years.
21. My friends KKN Supreme Sabrang, Elvera Fodju, Dewa Prasetya, Chyntia Winny, Shekar Sharaswati, Abang Yores, Christian Wibi, Rizky Mesias, Anita Apriani, Yenni Karunia, Melyanti being the

second family while in Pad. Sabrang. Thank you thank you for the togetherness and spirit has given.

22. Astera INA Team, Dode Debby, Chandra Raditya, Rio Bagastyan keep and remain me to keep optimism in new perspective (heuheu).
23. My special friends in photo and video shoot Adhit Christianto who allways give attention and much support as a lurds.
24. All my friends, juniors, and seniors in Civil Engineering Program especially in the International Civil Engineering Program for their support and cooperation which help me to complete this report.

I realize, this report has some mistakes. Therefore I accept any form of suggestion for further improvement. Finally, I hope this report may be useful for the reader. Thank you.

Yogyakarta, July 2018

The Author

Gregorius Edwin Yonathan

TABLE OF CONTENT

LIST OF FIGURE

LIST OF TABLE

LIST OF ATTACHMENT

ABSTRACT

A STUDY OF APPLICATION OF *UNMANNED AERIAL SYSTEMS* IN CONSTRUCTION PROJECTS, Gregorius Edwin Yonathan, Student Number 13.13.15057, year of 2018, Construction Management, Civil Engineering International Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.

Unmanned aerial vehicles, commonly known as drones, are a growing technology in all sorts of industries. In spite of studies exploring potential applications of unmanned aerial systems (UASs), the particular perception use and value of visual assets (photographs or video) collected with UASs for construction management tasks is not well understood. This paper presents an exploratory case study to identify applications of visual assets obtained from UASs and conventional for construction management tasks. The main of this case study is a better understanding of the use of UASs for construction management tasks and cost implications.

In this study, construction project applied of unmanned aerial systems (UASs) supervisory is a half from the total respondent (50%) and the rest is still with the conventional supervisory in Yogyakarta and Jakarta. Survey result of UASs application 2016 - 2017 for safety monitoring, aerial photography to track job progress have an increasing 40% of the application usage and inspection of difficult areas increasing 20% along with a good report supervisory in their business.

From the result of data analysis showed most potential applications of UASs mainly for track job progress monitoring, evaluating safety monitoring and support (K3), and inspection of difficult areas. In addition, an analysis UASs (drone) is more cost-effective financing rather than conventional supervisory. The average percent to total wage project supervisory UASs and conventional is 0,212 %. Then conventional supervisory more expensive with the average percent to total wage 0,450 %. Differences between both method significant high competitive expenses, with the average percent to total wage amount 0,24 %. Appears that group statistics total worker wage conventional supervisory higher than UASs & conventional supervisory (0,44960 > 0,21160). These result indicate that UASs and conventional supervisory really does have an effect on total worker wage supervisory. It was found that high means is spend more total worker wage from the total amount of staff (expensive), meanwhile result means have low mean (small). It was found that small mean is spend more less total worker wage from the total amount of staff (more cost-effective financing).

Key Words: Construction Management, Drones, Supervisory Cost, Unmanned Aerial Systems (UASs).