

**DEVELOPING A DIGITAL KEY PERFORMANCE INDICATOR
INVENTORY DASHBOARD BY USING THE WATERFALL MODEL TO
IMPROVE ACCURACY IN DECISION MAKING AT PT UNITED
TRACTORS TARAKAN**

By

Iddo Nathanael Lumangkun
12207017

BACHELOR'S DEGREE
in

INDUSTRIAL ENGINEERING
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

Revision after the Thesis Defense on 10 July 2024

STATEMENT BY THE AUTHOR

I vouch that this work I'm submitting is completely original. According to my best knowledge, it doesn't contain any ideas or content that someone else has published or written before. Additionally, it doesn't include any significant portion of material I used to earn another degree or diploma elsewhere, unless I've properly credited it within this submission.



Iddo Nathanael Lumangkun

Student

Date: 23 July 2024

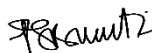
Approved by:



Dr. Maulahikmah Galinium, S.Kom, M.Sc.

Thesis Advisor

Date: 23 July 2024



Ir. Triarti Saraswati, M.Eng.

Thesis Co-Advisor

Date 23 July 2024



Dr. Maulahikmah Galinium, S.Kom, M.Sc

Dean

Date: 23 July 2024

ABSTRACT

DEVELOPING A DIGITAL KEY PERFORMANCE INDICATOR INVENTORY DASHBOARD BY USING THE WATERFALL MODEL AT PT UNITED TRACTORS TARAKAN

By

Iddo Nathanael Lumangkun
Dr. Maulahikmah Galinium, S.Kom, M.Sc., Advisor
Ms Ir. Triarti Saraswati, M.Eng., Co-Advisor

SWISS GERMAN UNIVERSITY

PT United Tractors Tarakan branch is a company that sells heavy equipment and provides services. Founded in 1972, the company is home to five major heavy equipment brands, including Komatsu, Scania, Tadano, UD Trucks, and Bomag. In order to remain competitive, it is imperative for the company to keep up with the significant changes brought about by the digitalization era. PT United Tractors Tarakan is currently building a Key Performance Indicator Dashboard to measure Inventory Performance. Therefore, PT United Tractors Tarakan needs a KPI Dashboard that is easy to understand, accessible online, and up to date. The purpose of this research is to develop a web-based application to create a digital dashboard using Waterfall Methodology and ensure that the study results run well according to current needs. The KPI Inventory dashboard developed has been successfully tested and well received by users because it is in accordance with its designation. This is evidenced by the results of the User Experience questionnaire which shows an “Excellent” and “Good” assessment and has been well received by users using the User Acceptance Test. Suggestions for further development include: improving the quality of human resources through system-related training, developing similar systems for other divisions within the company.

Keywords: Inventory Performance, Key Performance Indicator, Digital Dashboard, Waterfall Methodology, Web-Based Application, User Experience questionnaire, User Acceptance Test

© Copyright 2024
by Iddo Nathanael Lumangkun
All rights reserved

DEDICATION

Karya ini, buah pergumulan pikiran dan dedikasi yang tiada henti, kupersembahkan dengan penuh rasa syukur dan cinta kepada kedua orang tua tercinta, yang telah menanamkan nilai-nilai luhur dan menuntunku di jalan ilmu pengetahuan dan kepada belahan jiwa yang selalu setia memberikan dukungan dan semangat dalam suka dan duka.

ACKNOWLEDGEMENTS

Yang paling utama saya ucapkan kepada Tuhan Yesus Kristus Allah Bapa yang telah memberikan saya kemampuan dan kekuatan sehingga saya dapat menyelesaikan tesis ini.

Dengan penuh rasa hormat, saya ingin menyampaikan rasa terima kasih yang mendalam kepada keluarga tercinta, kekasih tercinta, dan sahabat-sahabat terbaik saya atas doa dan dukungan yang tiada henti mereka berikan selama perjalanan saya meraih gelar sarjana.

Tak lupa juga saya mengucapkan banyak terimakasih kepada bapak Dr. Maulahikmah Galinium, S.Kom, M.Sc., dan Ibu Ir. Triarti Saraswati, M., yang telah dengan sabar membimbing dan mengarahkan dalam menyelesaikan skripsi ini. Para dosen dan staf pengajar, yang telah memberikan ilmu pengetahuan dan pengalaman berharga selama masa perkuliahan serta kepada institusi pendidikan tercinta, yang telah menyediakan wadah dan kesempatan bagi penulis untuk belajar dan berkembang.

Terlebih lagi saya ucapkan banyak terimakasih kepada PT United Tractors cabang Tarakan terutama untuk *Parts Department Head* yang telah memberikan dukungan dan bantuan untuk menyusun skripsi ini.

Semoga skripsi ini menjadi bukti nyata dedikasi dan komitmen saya dalam menuntut ilmu pengetahuan. Saya menyadari bahwa masih banyak kekurangan dalam karya ini, oleh karena itu kritik dan saran yang membangun senantiasa saya harapkan.

TABLE OF CONTENTS

STATEMENT BY THE AUTHOR.....	2
ABSTRACT.....	3
DEDICATION.....	5
ACKNOWLEDGEMENTS.....	6
TABLE OF CONTENTS.....	7
LIST OF FIGURES	10
LIST OF TABLES.....	11
LIST OF EQUATION	12
BAB 1 - PENDAHULUAN.....	13
1.1 Latar Belakang.....	13
1.2 Masalah Penelitian.....	14
1.3 Tujuan Penelitian.....	14
1.4 Pertanyaan Penelitian	14
1.5 Hipotesis.....	14
1.6 Manfaat Penelitian.....	14
1.7 Ruang Lingkup Penelitian	15
1.7 Kerangka Tesis	15
BAB II – TINJAUAN PUSTAKA	16
2.1 Managemen Kinerja	16
2.2 Key Performance Indicator.....	17
2.3 Digitisasi dan Digitalisasi.....	17
2.4 Dashboard.....	18

2.5	<i>Software Development Life Cycle (SDLC)</i>	18
2.6	<i>The Waterfall Model</i>	19
2.7	Unified Modelling Language (UML).....	21
2.8	Diagram Arsitektur.....	21
2.9	Use Case Diagram.....	22
2.10	Activity Diagram.....	24
2.11	User Experience Questionnaire (UEQ).....	26
BAB 3. METODOLOGI PENELITIAN		30
3.1	Overview Methodology.....	31
3.2	Pengumpulan Data.....	32
3.3	Pengajuan Solusi dan Rencana.....	35
3.4	Pengembangan Model.....	35
3.5	Evaluasi.....	35
BAB 4. HASIL DAN DISKUSI		36
4.1	Identifikasi Masalah.....	36
4.2	Pengembangan Web Aplikasi.....	38
4.2.1	Tahap Komunikasi.....	38
4.2.2	Tahap Perencanaan.....	42
4.2.3	Tahap Pemodelan.....	43
4.2.4	Tahap Konstruksi.....	46
4.2.5	Tahap Uji Coba.....	54
4.2.6	Tahap Penyebaran.....	65
BAB 5. KESIMPULAN DAN SARAN		66
5.1	Kesimpulan.....	66
5.1	Saran.....	66
GLOSSARY		68
REFERENCES		69

APPENDIX A – USER ACCEPTANCE TEST RESULT	72
APPENDIX B – USER MANUAL PENGGUNAAN DASHBOARD.....	74
CURRICULUM VITAE	79

LIST OF FIGURES

Figures	Page
Gambar 2.1 <i>Waterfall Model Process</i>	19
Gambar 2.2 <i>Architecture Diagram</i> (https://aws.amazon.com/).....	22
Gambar 2.3 Contoh <i>Use Case Diagram</i>	23
Gambar 2.4 Bentuk <i>Use Case</i>	24
Gambar 2.5 Bentuk <i>actors</i>	24
Gambar 2.6 Simbol Activity Diagram	25
Gambar 2.7 Contoh Grafik UEQ	26
Gambar 2.8 Struktur Skala dari UEQ	28
Gambar 2.9 Kriteria Penilaian UEQ	29
Gambar 3.1 Metodologi Penelitian	30
Gambar 4.1 Fishbone Diagram Identifikasi Masalah	37
Gambar 4.2 Survey Kombinasi Warna	39
Gambar 4.3 Diagram Arsitektur.....	44
Gambar 4.4 <i>Use Case Diagram</i> Dashboard KPI Online	45
Gambar 4.5 Diagram Aktivitas.....	46
Gambar 4.6 Tampilan Google Spreadsheet	47
Gambar 4.7 Tampilan Looker Studio (1).....	48
Gambar 4.8 Tampilan Looker Studio (2).....	49
Gambar 4.9 Tampilan Looker Studio (3).....	49
Gambar 4.10 Tampilan Sumber data yang akan dikoneksi	50
Gambar 4.11 Data yang sudah dikonversi menjadi Dashboard Online	51
Gambar 4.12 Dashboard KPI Inventory	52
Gambar 4.13 Tampilan UEQ Dashboard KPI Inventory	60
Gambar 4.14 Nilai UEQ	61
Gambar 4.15 Skor Ketepatan	62
Gambar 4.16 Penyebaran <i>Dashboard</i> dengan menggunakan Email	65

LIST OF TABLES

Table	Page
Tabel 4.1 Hasil FGD Pemilihan KPI	38
Tabel 4.2 Daftar Pengguna.....	40
Tabel 4.3 Daftar Kebutuhan Pengguna	41
Tabel 4.4 Kerangka Waktu Proyek	42
Tabel 4.5 Problem, Identification, and Corrective Action	50
Tabel 4.6 Keterangan Dashboard.....	53
Tabel 4.7 Tabel Pengujian (Masuk ke dalam dashboard).....	54
Tabel 4.8 Tabel Pengujian (Tampilan Daftar KPI).....	55
Tabel 4.9 Tabel Pengujian (Mengganti Periode)	56
Tabel 4.10 Tabel Pengujian (Mengubah Achievement KPI).....	57
Tabel 4.11 Tabel Pengujian (Pengunduh KPI)	57
Tabel 4.12 Tabel Pengujian (Pengelolaan Bank Data KPI).....	58
Tabel 4.13 <i>User Acceptance Test</i>	59
Tabel 4.14 Hasil Penilaian Uji Coba <i>Dashboard</i>	61
Tabel 4.15 Waktu pemrosesan <i>dashboard</i> konvensional vs <i>dashboard online</i>	63
Tabel 4.16 Perbandingan fitur <i>online dashboard</i> dan <i>conventional dashboard</i>	64

LIST OF EQUATION

Equation	Page
(3.1) Rumus Perhitungan Days Of Inventory	33
(3.2) Rumus Perhitungan Availability	33
(3.3) Rumus Perhitungan Ratio Over Stock.....	33
(3.4) Rumus Perhitungan Stock Order Composition	33
(3.5) Rumus Perhitungan On Time In Full	34
(3.6) Rumus Perhitungan Gross Profit.....	34
(3.7) Rumus Perhitungan Warehouse Shipping Expanse	34