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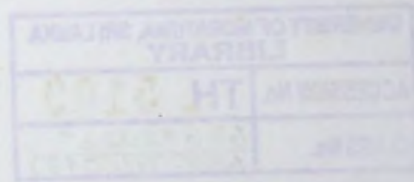
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INTEGRATING MACHINE LEARNING TO OPTIMIZE STOCK FLOW AND GOODS REPLENISHMENT IN INTRALOGISTICS

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STATEMENT OF THE SUPERVISOR

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ABSTRACT

The intralogistics area has emerged and developed as a result of increasing the importance of Industry 4.0. Autonomously running intralogistics systems are gaining more and more attention as a result of digitalization. Intralogistics is a process of organization, control, execution, and optimization of internal material and information movement. It is a complex interplay of several logistical operations. The literature study highlighted how logistics inside the warehouse facility transformed with the major trends in the context of optimization, automation, system integration, and mathematical modeling techniques. Further, this study proves that numerous technologies can be altered and combined to improve intralogistics in terms of accuracy, quality, efficacy as well as sustainable aspects even in more complex settings in the discussion. In the paradigm shift of moving traditional internal logistics systems to autonomous advanced intralogistics systems, integrating various operations research applications with industry 4.0 concepts is vital. It will support to develop optimized, organized, and automated logistic systems within the warehouse. In this study, we have considered developing a storage and goods retrieval system amalgamating the intralogistics concept. In order to develop a demand-driven optimized storage plan for the warehouse, storage allocation was focused. The storage allocation was done by classification technique mainly considering the total consumption value of the items. The used classification mechanism was improved by integrating Machine learning (ML) approach. ML-based classification addresses the question that how a computerized system can automatically identify the correct storage segmentation for the items in the inventory including newly added items. Apart from the consumption value, cost of the item issued quantity of the item, and frequency of issuing were considered to develop the model. It is easy to retrieve the items from the warehouse as it is in the correct demarcated location to fulfill the orders received for the warehouse. The developed storage allocation will be used to perform a simulation model in order to identify how inventory segmentation utilizes and eases the internal logistics.

Keywords: intralogistics, storage and goods replenishment, inventory classification Machine Learning, Industry 4.0, optimization, simulation



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TABLE OF CONTENT

DECLARATION OF ORIGINALITY	i
STATEMENT OF THE SUPERVISOR	ii
LIST OF TABLES	vi
LIST OF ABBREVIATION	ix
CHAPTER ONE: INTRODUCTION	1
1.1. Background of the Study	1
1.2. Structure of the Thesis.....	3
CHAPTER TWO: LITERATURE REVIEW	4
2.1. Industry 4.0.....	4
2.1.1. Logistics 4.0.....	7
2.1.2. Industry 4.0 Applications in Warehouse Operations.....	9
2.2. Intralogistics	11
2.2.1. Evolution of Intralogistics	11
2.2.2. Current & Future Trends in Intralogistics	15
2.2.3. Internal Logistics and Modern Warehouse Management.....	16
2.2.4. Warehouse Optimization	19
2.3. Warehousing & Inventory Management	21
2.3.1. Inventory Optimization in SCM	21
2.3.2. Inventory Optimization using Machine Learning.....	23
2.3.3. Inventory Replenishment in Intralogistics.....	23
2.4. Research Gaps	24
2.5. Research Problems & Research Objectives	28
2.5.1. Practical Considerations	28
2.5.2. Research Problems.....	28
2.5.3. Research Objectives.....	28
CHAPTER THREE: METHODOLOGY	29
3.1. Identify the Demand for Goods and ABC Analysis.....	29
3.2. Improved Inventory Classification through Machine Learning	32
3.2.1. Supervised classification through Machine learning.....	32



3.3. Simulation Modeling.....	35
3.3.1. Software Selection for Simulation.....	37
3.3.2. Discrete Event Simulation.....	39
3.3.3. Simulation Optimization.....	41
3.4. Structure of the Methodology	42
CHAPTER FOUR: DATA ANALYSIS.....	43
4.1. Data Collection.....	43
4.2. ABC Classification.....	43
4.3. Inventory Classification using Machine Learning	45
4.3.1. Attributes of Dataset.....	45
4.3.2. Scatter Plots	45
4.3.3. Distribution of Variables	49
4.3.4. Classification Tree.....	52
4.3.5. Confusion Matrix.....	53
4.3.6. Receiver Operating Characteristics Curve.....	55
4.3.7. Test and Score	56
4.4. Simulation Modeling.....	57
4.4.1. Warehouse Simulation Model 1 – Without Storage Allocation Plan.....	58
4.4.2. Warehouse simulation model 2 – With storage allocation plan.....	59
CHAPTER FIVE: CONCLUSION.....	61
5.1. Results & Discussion	61
5.2. Future Research Directions	62
5.3. Recommendations	63
REFERENCES	64
APPENDIX.....	78

LIST OF TABLES

Table 1: Evaluation of Simulation softwares.....	38
Table 2: Inventory segmentation.....	44

LIST OF FIGURES

Figure 1: Key enabling technologies of Industry 4.0..... 5

Figure 2: Managing internal logistics 12

Figure 3: Inventory optimization techniques 22

Figure 4: Number of publications in intralogistics domain 25

Figure 5: Key areas discussed under intralogistics 25

Figure 6: Main decision problems in intralogistics storage systems 27

Figure 7: Discrete event simulation using FlexSim software 40

Figure 8: Overall design for the methodology 42

Figure 9: ABC Analysis 44

Figure 10: Scatter plot for category & issued quantity 46

Figure 11: Scatter plot for category & cost 46

Figure 12: Scatter plot for category & frequency 47

Figure 13: Scatter plot for category & total value 47

Figure 14: Scatter plot for issued quantity & total value 48

Figure 15: Scatter plot for cost & total value 48

Figure 16: Scatter plot for frequency & total value 48

Figure 17: Informative projections 49

Figure 18: Distribution of data - cost component 50

Figure 19: Distribution of data - issued quantity 50

Figure 20: Distribution of data - frequency 51

Figure 21: Distribution of data - total value 51

Figure 22: Pareto distribution for total consumption value 52

Figure 23: Classification tree with all attributes 52

Figure 24: Classification tree removing total consumption value attribute 53

Figure 25: Confusion matrix for logistics regression 54

Figure 26: Confusion matrix for KNN 54

Figure 27: Confusion matrix for random forest 55

Figure 28: ROC curve for all classifiers 56

Figure 29: Evaluation results for all classifiers 57

Figure 30: Storage allocation simulation model - loading to first empty space 58



Figure 31: Status of the model 1	59
Figure 32:Storage allocation simulation model - loading to demarcated spaces.....	59
Figure 33: Status of the model 2	60

LIST OF ABBREVIATION

<i>Abbreviation</i>	<i>Description</i>
AGV	Automated Guided Vehicles
AI	Artificial Intelligence
AMR	Autonomous Mobile Robots
AR	Augmented Reality
AS/RS	Automated Storage and Retrieval Systems
BDA	Big Data Analytics
CPPS	Cyber Production Physical System
CPS	Cyber-Physical System
DL	Deep Learning
ICPS	Industrial Cyber-Physical System
IIoT	Industrial Internet of Things
IoT	Internet of Things
ML	Machine Learning
OPS	Order Picking System
SC	Supply Chain
SCM	Supply Chain Management
VR	Virtual Reality
WMS	Warehouse Management System