THE APPLICATION OF TIME-DRIVEN ACTIVITY-BASED COSTING IN PRODUCT OPERATION AND SERVICE OPERATION

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Master of Science

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Master of Science.

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I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Master of Science

Faculty of Manufacturing & Mechatronic Engineering Technology

UNIVERSITI MALAYSIA PAHANG

MARCH 2021

ACKNOWLEDGEMENTS

I am grateful and would like to express my genuine gratitude to several individuals and organizations for supporting me throughout my master's degree research. Firstly, I would like to indicate my earnest appreciation and thankfulness to my supervisor Dr. Mohd Yazid bin Abu for the endless support and teach in order to accomplish my research and thesis. I am also grateful for his patience, motivation and gigantic knowledge to help and guide me during writing this research from chapter one until last chapter. I also sincerely thanks for the time spent proofreading and correcting my many mistakes.

I acknowledge my wholehearted thanks to managers, staffs and workers in Prosper Palm Oil Mill Sdn Bhd. and academic library of Universiti Malaysia Pahang for invaluable guidance, continuous encouragement and constant support in making this research possible. Without their help, I think I could not complete this study.

Furthermore, I also would like to express my gratefulness to my dearest friends and postgraduate mates for any obstacles that we faces together through the master's degree journey. The time we spent together are the memorable experiences that we might remember always.

Lastly, bigger appreciation to my lovely family, especially to my late mother, dearest father and three older sisters that always gave morale support, countless encouragement and sacrifices throughout writing this study and my life in general. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to attain my goals.

ABSTRAK

Dua prinsip yang saling berkaitan terdiri daripada produk dan perkhidmatan di mana kebanyakan produk sebenarnya mempunyai aspek perkhidmatan. Produk adalah operasi yang dapat dilihat, sementara perkhidmatan mempunyai ciri-ciri yang tidak ketara. Walaupun begitu, terdapat tiga objektif dalam kajian ini yang berkaitan dengan penyataan masalah dalam kedua-dua operasi tersebut. Dalam praktik kaedah pengekosan semasa di ladang kelapa sawit dan perpustakaan akademik, hampir tidak ada persamaan waktu untuk menafsirkan kekeliruan aktiviti. Kaedah itu tidak melaksanakan persamaan waktu menyebabkan waktu pemprosesan yang ditentukan oleh syarikat dan organisasi tidak selaras dengan waktu pemprosesan sebenar di stesen kerja. Kemudian, praktis semasa juga tidak menggambarkan hubungan antara sumber yang dibekalkan dan keupayaan praktikal. Ini adalah penting untuk melaksanakan kadar kos kapasiti bagi menafsirkannya dalam bentuk kapasiti yang tidak digunakan. Selain itu, tidak semestinya pengeluaran data persamaan waktu dan kadar kos kapasiti lebih mudah diakses dalam operasi perkhidmatan manakala lebih sukar diperoleh dalam operasi produk. Tujuan kajian ini adalah untuk membandingkan aplikasi *Time-driven Activity-based Costing (TDABC*) antara operasi produk dan perkhidmatan melalui kriteria-kriteria yang dipilih. Untuk operasi produk, kajian dilakukan di ladang kelapa sawit Simpai Division 1 di Prosper Palm Oil Mill Sdn. Bhd. yang terletak di Muadzam Shah, Pahang. Ladang ini terbahagi kepada tiga pusat aktiviti iaitu tapak semaian, penanaman semula dan tanjakan. Untuk operasi perkhidmatan, pengumpulan data perpustakaan akademik diambil di Universiti Malaysia Pahang. Walau bagaimanapun, dalam kajian ini hanya dua pusat aktiviti yang digunakan iaitu pemerolehan dan pengkatalogan. Analisis data menggunakan empat langkah TDABC iaitu pemetaan proses, persamaan waktu, kadar kos kapasiti dan analisis ramalan. Sebagai hasilnya, dalam operasi produk, jumlah masa yang digunakan di ketiga-tiga pusat aktiviti perladangan kelapa sawit untuk kawasan matang adalah 3,220,928,04 minit dengan jumlah kapasiti terpakai sebanyak RM6,041,995.10 dan untuk kawasan belum matang ialah 2,390,513,94 minit dengan jumlah kapasiti terpakai sebanyak RM5,591,587.73. Di kawasan matang dan belum matang, jumlah masa yang tidak digunakan masing-masing adalah 170,188 dan 100,450.50 minit. Manakala, masa yang tidak mencukupi adalah -2,241,951.04 dan -1,683,844.44 minit untuk matang dan tidak matang secara berasingan. Kemudian, kapasiti yang tidak digunakan di kawasan matang dan belum matang adalah RM4,500,806.30 dan RM4,248,485.33. Sebaliknya, dalam operasi perkhidmatan, jumlah masa yang digunakan adalah 39,932.73 minit dengan jumlah kapasiti terpakai sebanyak RM47,667.61 untuk material tempatan dan 29,571.82 minit dengan jumlah kapasiti terpakai sebanyak RM16,876.28 untuk material luar negara. Jumlah masa yang tidak digunakan masing-masing adalah 5,681.92 dan 12,892.88 minit manakala jumlah waktu yang tidak mencukupi adalah -3,374.65 dan -224.70 minit dalam material tempatan dan luar negara. Kapasiti yang tidak digunakan masing-masing berjumlah RM40,960.02 dan RM144,202,51 dalam material tempatan dan luar negara. Akhirnya, dari segi kapasiti yang tidak digunakan, tidak ada perbezaan yang ketara ketika mengaplikasikan TDABC dalam operasi produk dan perkhidmatan. Walau bagaimanapun, dari segi ketergantungan proses, aktiviti dalam operasi produk saling bergantung antara satu sama lain. Manakala aktiviti dalam operasi perkhidmatan adalah bebas. Kesimpulannya, TDABC adalah model yang dapat menganalisa kapasiti tidak digunakan dan membina strategi untuk memaksimumkan nilai sesuatu organisasi.

ABSTRACT

Two deeply connected principles consist of products and services which most products actually have a service aspect. The product is an operation that can be point at, while the service is any activity which have intangible characteristics. Nevertheless, there are three objectives in this work which related to problem statements in both operations. In current practise of costing method in palm oil plantation and academic library, there are almost no establishment of time equation to interpret deviation of activities. The method do not implement time equation so processing time determined by company and organization are not in accordance with actual processing time in work station. Then, the current practise do not illustrate the correlation between supplied resources and practical capacity. It is important to develop capacity cost rate (CCR) in order to interpret it in form of unused capacity. Other than that, it is not necessarily proved that data extraction of time equation and CCR in service operation is easily accessible, while data extraction in product operation is more difficult to obtain. The purpose of this study is to compare the Time-driven Activity-based Costing (TDABC) application between product and service operation through selected criteria. For product operation, this work conducted at palm oil plantation Simpai Division 1 Estate in Prosper Palm Oil Mill Sdn. Bhd. which located in Muadzam Shah, Pahang. The estate is divided into three activity centers which are nursery, replanting and ramp. For service operation, data collection of academic library are taken in Universiti Malaysia Pahang. However, in this work only two activity centers are been discussed which are acquisition and cataloging. The analysis of the data is using four steps of TDABC method which are process mapping, time equation, CCR and forecast analysis. Eventually, in product operation, the total used time in all three activity centers of palm oil plantation are 3,220,928.04 minutes for mature area and 2,390,513.94 minutes for immature area. The total used capacity are RM6,041,995.10 for mature area and RM5,591,587.73 for immature area. In mature and immature area, the total unused time are 170,188 and 100,450.50 minutes respectively. Whereas, the insufficient time are -2,241,951.04 and -1,683,844.44 minutes for mature and immature separately. Then, the unused capacity in mature and immature area are RM4,500,806.30 and RM4,248,485.33. On the other hand, in service operation, the total used time are 39,932.73 minutes for local material and 29,571.82 minutes for oversea material. The total used capacity in both local and oversea materials are RM47,667.61 and RM16,876.28 respectively. The total unused time are 5,681.92 and 12,892.88 minutes in local and oversea material respectively. Whereas for local and oversea material, the total insufficient time are -3,374.65 and -224.70 minutes accordingly. The unused capacity are RM40,960.02 and RM144,202.51 in local and oversea material respectively. Ultimately, in terms of unused capacity, there are no significant differences when applying TDABC in product and service operation. Whereas, in terms of process dependency, activities in product operation is dependent to one another. While activities in service operation is independent. In a nutshell, TDABC is a model which can analyzed idle capacity and design strategies towards maximization of organization's value.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

T_t	Time needed to perform an activity (minute)
β_o	Standard time to perform the basic activity (minute)
β_i	Estimated time to perform the incremental activity (minute)
X_i	Quantity of the incremental activity (time)

LIST OF ABBREVIATIONS

ABC	Activity-based costing
CCR	Capacity cost rate
EFB	Empty fruit bunch
FCP	Fruit collection point
FFB	Fresh fruit bunch
FGV	Felda Global Ventures Holdings
ISBN	International Standard Book Number
LCC	Legume cover crop
LO	Letter of offer
MIP	Mixed integer programming
PDCA	Plan Do Check Act cycle
RCA	Resource Consumption Accounting
RFID	Radio Frequency Identification
RPM	Pelvic reconstructive medicine clinic
SRF	Slow release fertilizer
TCS	Traditional costing system
TDABC	Time-driven activity-based costing
TOC	Theory of constraints

LIST OF APPENDICES

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