THE IMPACT OF REMANUFACTURED PRODUCTS IN SUPPLY CHAIN INDUSTRY: CONSUMER VALUE CONSIDERATION

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APPROVAL

"I hereby declared that I had read through this thesis and in my opinion that this thesis is adequate in terms of scope and quality which fulfil the requirements for the award of Bachelor of Technology Management (Supply Chain Management and Logistics)."

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A thesis submitted in fulfilment of the requirements for the degree of Bachelor of Technology Management in Supply Chain Management and Logistics

Faculty of Technology Management and Technopreneurship
Universiti Teknikal Malaysia Melaka

January 2023

DECLARATION OF ORIGINAL WORK

I hereby declare that this research thesis is my own original work, and it has been written by me in its entire. I have duly acknowledged all the sources of information which have been used in the thesis

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DEDICATION

I would like to sincerely express my appreciation towards my supervisor, Dr. Nurhayati Binti Kamarudin, who has guided me along this research journey. I would also like to convey my deepest appreciation towards my family members and fellow friends, who have provided me with moral and emotional support throughout this research. Before I finish, I also appreciate all the participants that have assisted me to complete my research.

ACKNOWLEDGEMENT

First and foremost, I would like to express my sincere appreciation to my supervisor, Dr. Nurhayati Binti Kamarudin for her patient guidance, advice and support. I am grateful for having the privilege to learn with Dr and I believed I have learned from the best. Without help and guidance of Dr.Hyatt, this project would not be completed successfully.

Besides my supervisor, I would like to extend my thanks to UTeM for providing a conducive learning environment, knowledgeable learning resources and insight information that assisted for me in my research. I also want to offer my special thanks to my panel, Datin Dr. Suraya Binti Ahmad who gave her constructive recommendations and sincere opinions on this project.

Finally, I wish to thank my parents and friends for their support and encouragement in completing my research.

ABSTRACT

The success of closed-loop supply chains depends on consumer acceptance of remanufactured products. However, little is known about research on how consumers value such remanufactured products. Thus, the objective of this study is to examine the consumer value considerations of remanufactured products and to determine the most critical consumer value considerations which impact the adoption of remanufactured products in supply chain industry. Consumer consideration of the value of remanufactured products were measured in terms of perceived benefits (environmental benefits and price advantages) and perceived sacrifice (perceived risks). Next, quantitative methods have been used in carrying out this research. Data were collected on a five-point Likert scale through a questionnaire in an online Google Form and distributed physically to respondents. The data was gathered from 196 respondents located in Malacca. Statistical Packages for Social Sciences (S.P.S.S) and SmartPLS were used to analyze the data. According to the results of this study, there are moderate significant links between perceived benefits and perceived sacrifice with the adoption of remanufactured products. For future reference, this study is considered a significant contribution to researchers and practitioners' better understanding of the role of consumers in closed-loop supply chains in relation to the acceptance of remanufactured products.

Keyword: Remanufacturing, Closed-loop Supply Chains, Consumer value considerations

ABSTRAK

Kejayaan rantaian bekalan gelung tertutup bergantung pada penerimaan pengguna terhadap produk pembuatan semula. Walau bagaimanapun, sedikit yang diketahui tentang penyelidikan tentang cara pengguna menghargai produk pembuatan semula tersebut. Oleh itu, objektif kajian ini adalah untuk mengkaji pertimbangan nilai pengguna bagi produk pembuatan semula dan untuk menentukan pertimbangan nilai pengguna paling kritikal yang memberi kesan kepada penggunaan produk pembuatan semula dalam industri rantaian bekalan. Pertimbangan pengguna terhadap nilai produk pembuatan semula diukur dari segi manfaat yang dirasakan (manfaat alam sekitar dan kelebihan harga) dan pengorbanan yang dirasakan (risiko yang dirasakan). Seterusnya, kaedah kuantitatif telah digunakan dalam melaksanakan penyelidikan ini. Data dikumpul pada skala Likert lima mata melalui soal selidik dalam Borang Google dalam talian dan diedarkan secara fizikal kepada responden. Data dikumpul daripada 196 responden yang berada di Melaka. Pakej Statistik untuk Sains Sosial (S.P.S.S) dan SmartPLS digunakan untuk menganalisis data. Menurut hasil kajian ini, terdapat hubungan signifikan yang sederhana antara faedah yang dirasakan dan pengorbanan yang dirasakan dengan penggunaan produk pembuatan semula. Untuk rujukan masa hadapan, kajian ini dianggap sebagai sumbangan yang signifikan kepada pemahaman penyelidik dan pengamal yang lebih baik tentang peranan pengguna dalam rantaian bekalan gelung tertutup berhubung dengan penerimaan produk pembuatan semula.

Kata kunci: Pengilangan Semula, Rantaian Bekalan Gelung Tertutup, Pertimbangan nilai pengguna

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LIST OF ABBREVIATIONS

DOI	-	Diffusion of Innovation
CLSC	-	Closed-loop Supply Chain
LCA	-	Life Cycle Assessment
LCC	-	Life Cycle Cost Analysis
EOL	-	End-of-Life
WTP	-	Willingness to Pay
C2C	-	Consumer-to-Consumer
PI	-	Purchase Intention
RL	-	Reverse Logistics
IV	-	Independent Variable
DV	-	Dependent Variable
PBOEB (E)	-	Perceived Benefit on Environmentally Benefits
PBOPA (P)	-	Perceived Benefit on Price Advantages
PSOPR (R)	-	Perceived Sacrifice on Perceived Risks
AORP (Q)	-	Adoption of Remanufactured Products
SPSS	-	Statistical Package for Social Science

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

According to Wang et al. (2020), Closed Loop Supply Chain Management (CLSCM) is an important contribution to achieving sustainable performance in the supply chain industry. Beside from the management awareness, the one of the difficulties with the closed loop supply chain (CLSC) originates from a lack of public awareness (Panigrahi et al., 2018). This means consumers have a better understanding of how and why remanufacturing can be an eco-friendlier decision.

The closed supply chain addresses sustainability by collecting used or end-of-life items returned for recovery, refurbishment, remanufacturing, reuse and recycling (Islam and Huda., 2018). According to Mishra et al. (2018), to establish a unique system, closed loop combines information flows, financial and physical connecting downstream organizations with upstream organizations along the supply chain. CLSC complements direct flow with reverse flow, which covers a larger range of operations and, in most cases, more parties than a typical supply chain.

The economic potential of closed-loop supply chains is considerable. From MahmoumGonbadi et al. (2021), the closed-loop supply chain (CLSC) has received a great deal of attention from a sustainability perspective as one of the key components of the circular economy. Closed-loop supply chains (CLSCs) are particularly crucial for a business since they allow the company to profit by returning things to customers and reimbursing the remaining additional value (Shekarian and Flapper, 2021), such as remanufacturing allows enterprises to participate in pro-environmental actions (Singhal et al., 2019a). As a result, methods to prolong a product's life cycle have attracted growing attention in both theory and practise. Product returns are also becoming a growing worry for industry (Panigrahi et al., 2018).

Furthermore, CLSCs have a number of good impacts for environment, including the conservation of primary resources, the reduction of landfill space, and the reduction of the impact of potentially harmful substances (MahmoumGonbadi et al., 2021). From Shabbir et al. (2021), one of the aims of creating a closed-loop supply chain (CLSC) is to create a network with the aid of using launching and running the material flow across chain centres such that the beneficiaries' economic, environmental, and social goals are all optimised on the equal time.

Moreover, a closed loop supply chain (CLSC) performs the following primary activities which are reverse logistics, product acquisition, possibly product disposal, product inspection, remanufacturing and reselling products that have been remanufactured to original functions and quality (De Giovanni and Zaccour, 2022). Remanufacturing is a closed-loop manufacturing activity that recycles components that are still in good working to restore the residual value of discarded items (Wang et al., 2018a). Remanufacturing is excellent for the environment since it saves energy and materials while also producing products with a lesser price (Jiang et al., 2019). Before being reassembled and quality-tested, the products that have been returned is disassembled, the parts are properly cleaned, sorted, and reconditioned, and new parts may be manufactured (Singhal et al., 2019a). There are a vast range of remanufactured products across the world, including laptops, bicycles, machine tools, electric or electronic products, photocopiers, cellular phones, and computers (Testa et al., 2021).

1.2 Problem Statement

Many countries are grappling with a growing waste problem. One of the reasons for the increase in waste generation is the rapidly growing electrical and electronic waste (Jayaraman et al.,2019). Because of quicker technological clock speed, there were total of 2,283.7 tonnes of electrical and electronic waste (e-waste) collected by the Department of Environment (DoE) as of November 2021. Moreover, the quantity of e-waste collected exceeds the department's objective of 800 tonnes for the entire year 2021 (Malaymail, 2021). However, the current strategies of depositing e-waste in landfills or incinerating it are not sustainable (Shekarian and Flapper, 2021). It turns into an increasing number of critical withinside the destiny to control e-waste in one`s life. Recently, the 'throwaway' tradition has attracted a superb deal of interest from many institutional businesses that sell sustainable manufacturing and consumption (Wang et al., 2018a). However, electric powered and digital waste may be each a very good enterprise prospect and a rising international environmental crisis. Monitors, TVs, and mobile telephones are a number of the not unusual place digital gadgets that make a contribution to e-waste.

In spite of numerous e-waste legislation being introduced and put into law, the disposal of electronic waste (e-waste) in Southeast Asian countries is still relatively slow (Doan et al., 2019). All electronic products have a usable life, however after a particular period of time, they reach the end of their residual value (Jayaraman et al., 2019). Thus, the process of disposing various types of electrical and electronic equipment that is no longer functional to its owners is known as electronic garbage (e-waste) (Jayaraman et al., 2019). Electronic devices such as cell phones, refrigerators, consumer electronics, air conditioners, and laptops are common components of e-waste (Jayaraman et al., 2019).

Moreover, in a closed-loop supply chain, the reverse manufacturing process is also referred to as e-waste by remanufacturing and refurbishing the waste product to new finished good for future use (Doan et al., 2019). Hence, the consumer acceptance

of remanufactured products is very significant in reducing the e-waste (Sari et al., 2021).

Consumer acceptance of remanufactured goods is a fundamental difficulty to realising the full potential advantage of product recovery activities, according to several organisations. However, consumer engagement of remanufactured products is necessary for the success of the entire closed-loop supply chain (Panigrahi et al., 2018). Consumers' acceptability of remanufactured products is crucial to the CLSC's success (Singhal et al., 2019b).

While people in the manufacturing industry are familiar with the concept of remanufacturing, consumers are frequently unaware of how remanufactured products differ from new, used, or even repaired products in terms of product quality (Wang et al., 2018a). Admittedly, the remanufacturing sector's expansion is challenged by the lack of recognition and acceptability of consumers (Singhal et al., 2019a).

1.3 Research Questions

Consumers must accept remanufactured items in order for them to be adopted effectively. Furthermore, the overall effectiveness of the closed-loop supply chain mandates that remanufactured products receive substantial existing support of consumers. There is a risk that customers may be hesitant to adopt these items because to concerns about safety, performance, quality and upkeep (Subramoniam et al., 2009; Wang et al., 2018a).

Moreover, consumers' trust in remanufactured products may be affected by other factors. According to Panigrahi et al. (2018), one of the most significant obstacles to remanufactured products is a lack of consumer interest and understanding. However,

current literature reveals that substantial study is being undertaken into operational aspects of remanufacturing, but that marketing of remanufactured products is receiving less attention.

In the supply chain industry, Muranko et al. (2019) emphasise the need of analysing consumer behaviour. This is because many behavioural barriers hinder the development of a circular economy, but appropriate behavioural change interventions can help overcome these barriers. As a result, knowing consumers' value considerations toward remanufactured goods is essential for the remanufacturing industry's successful adoption. This research aims to contribute to consumer research on CLSC by assessing Malaysian citizens' consumer value considerations for remanufactured products. This study specifically covers the following research questions:

(RQ1) What are the consumer value consideration of remanufactured products?

(RQ2) What are the most critical consumer value considerations which impact the adoption of remanufactured products in supply chain industry?

1.4 Research Objectives

Research objectives derived from the formulation of problem statement are to examine the consumer value considerations of remanufactured products and to determine the most critical consumer value considerations which impact the adoption of remanufactured products in supply chain industry. By studying on a number of value perceptions and risk perceptions, this research will be beneficial to the remanufactured products as well as increase the consumers' acceptance of the remanufactured products to enhance value output across a product's life cycle. Briefly, the research objectives in this study are stated as below: