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# Circular Economy-based Product Substitution Design Rationale

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## Abstract

Purpose: This study describes an empirical study demonstrating the application of circular economy (CE) to respond to an urgent call to reduce plastic waste by utilizing waste from the furniture industry. Design/methodology/approach: this study employed the measurements of environmental impacts of plastic and wood-based toothbrushes using a life cycle assessment, complemented by an analysis of the wood substitution design process from a CE perspective. Findings: The findings from this study not only shed light on quantifying the benefits of product valorization improvement and retention but also provide a means of weighing the value against raw materials and production costs. Research limitations/implications: The developed model is still limited to the use of waste to replace existing product materials. This study also did not include other industrial waste such as agro-industrial waste or other degradable materials which may open up many chances for further studies. Practical implications: The study's primary contribution is a design rationale that assists the substitution of plastic material with wood waste, using toothbrushes as a case example of the substituted products. Social implications: This newly developed material can give potential income sources for the

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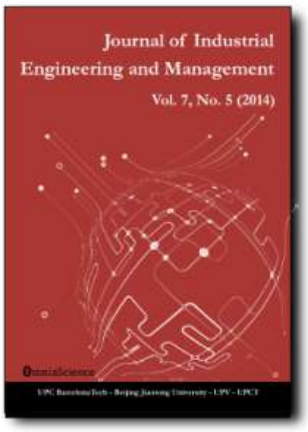


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# Circular economy-based product substitution design rationale: A case of personal care product

*Sri Hartini, Heru Prastawa, Benny Tjahjono, Bimastyaji Surya Ramadan*

## Abstract

**Purpose:** This study describes an empirical study demonstrating the application of circular economy (CE) to respond to an urgent call to reduce plastic waste by utilizing waste from the furniture industry.

**Design/methodology/approach:** this study employed the measurements of environmental impacts of plastic and wood-based toothbrushes using a life cycle assessment, complemented by an analysis of the wood substitution design process from a CE perspective.

**Findings:** The findings from this study not only shed light on quantifying the benefits of product valorization improvement and retention but also provide a means of weighing the value against raw materials and production costs.

**Research limitations/implications:** The developed model is still limited to the use of waste to replace existing product materials. This study also did not include other industrial waste such as agro-industrial waste or other degradable materials which may open up many chances for further studies.

**Practical implications:** The study's primary contribution is a design rationale that assists the substitution of plastic material with wood waste, using toothbrushes as a case example of the substituted products.

**Social implications:** This newly developed material can give potential income sources for the communities.

**Originality/value:** The novelty of this study lies to the substitution model of non-degradable materials to a more environmentally-friendly material which is studied thoroughly from functional analysis, design alternatives, and evaluation based on environmental, economic, and social aspects especially in case of personal care products (toothbrush).

## Keywords

Circular economy, life cycle assessment, material substitution, personal care product, sustainable design, wood waste

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# How Do Full-Service Carriers and Low-Cost Carriers Passengers Perceived Service Dimensions, Passengers' Satisfaction, and Loyalty Differently? An Empirical Study

Yuk Ting Hester Chow[1], C.H. Li[2], Shu-Lun Mak[2], Shek Ping Li[3], Pui Sze Tong[4], Chi Kit Fan[5], K.L. Keung[3]

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*Received: January 2022*
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***Abstract:***

***Purpose:*** In this study, group differences between full-service carriers (FSC) and low-cost carriers (LCC) in loyalty constructs are investigated, revealing the relationship between service quality and loyalty. This work focuses on five dimensions, including tangibility, empathy, assurance, responsiveness, and reliability, constitute service quality.

***Design/methodology/approach:*** 248 questionnaires were collected in the first half of 2019. The antecedents of customer loyalty are explored, and the group differences between FSC and LCC are analyzed. For assessing the path model with the consideration of group variance, the Partial Least Squares Multiple Group Analysis (PLS-MGA) was adopted to analyze the differences of the estimated inter-group coefficient.

***Findings:*** Our findings suggest that service assurance, service empathy, and service reliability positively impact the value perceived. The impact of service empathy on customer satisfaction in FSC is significantly diverse from LCC. Several suggestions are provided to FSC and LCC on improving their services in view of passengers' wants and interests.

***Originality/value:*** With the data collected at the Hong Kong International Airport (HKIA), this study examined the relationships among service quality, perceived value, customer satisfaction, and customer loyalty and divided service quality into five dimensions. The findings showed that assurance, empathy, and reliability of service quality positively affect the value perceived, and the effects of responsiveness and tangibility of service quality on perceived value are insignificant. Among the five aspects of service quality, assurance, reliability, responsiveness, and tangibility of the service quality are the pre-conditions of customer satisfaction. However, only the reliability of service is the antecedent of customer loyalty. Besides, the value perceived positively affects customers to be satisfactory and loyal. Furthermore, satisfaction degree also significantly influences the degree of customers' loyalty. As to the role of airline types, the sole effect is on customers' satisfaction is service empathy, with a significant difference between FSC and LCC.

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# SPC-Based Model for Evaluation of Training Processes in Industrial Context

Cristiano Jesus[3,1], Adilson Marcorin[2], Rui M. Lima[1], Rui M. Sousa[1], Ingrid Souza[1], Eliana Oliveira[4]

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*Received: June 2021*
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***Abstract:***

***Purpose:*** This article aims to present successful practices in the management of training processes based on virtual reality and augmented reality, namely a strategy for evaluating the process with the principle of continuous improvement in mind, and monitoring its performance in terms of productivity and waste levels. It is proposed to apply Statistical Process Control (SPC) tools to develop control charts for monitoring individual events (i-charts).

***Design/methodology/approach:*** The methodology is based on a case study developed in an industrial project and is guided by a literature review on Work-Based Learning (WBL) and SPC.

***Findings:*** The developed work shows that SPC tools are suitable for supporting decision making in situations where the data to be analyzed is generated by human-computer interactions, e.g., involving students and virtual learning environments.

***Originality/value:*** The innovative aspect presented in the article lies in the evaluation of the effectiveness of pedagogical resources arranged in simulation environments based on virtual and augmented reality. The accumulated knowledge about the application of SPC in service areas, and others that demand data analysis, reinforces the hypothesis of the suitability of its application in the case presented. This is an original application of SPC, normally used in business processes quality control, but which in this case is applied in an innovative way to the evaluation of industrial training processes, with the same spirit for which it was designed, i.e. to provide the means to manage the quality of a process.

***Keywords:*** industrial training evaluation, SPC (statistical process control), work-based learning; engineering process control

***To cite this article:***

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# Does Size Matter in Group Decision Making? Simulation Experiments with LNG Professionals Bidding in Auction Markets

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***Abstract:***

***Purpose:*** An important issue in decision-making processes is whether groups decide better than individuals. This paper compares the bidding behavior of groups of professionals while playing a business game that simulates, in a controlled environment, the sequential unit capacity auctions in the Spanish LNG market.

***Design/methodology/approach:*** First, we randomly grouped professionals in groups of different size–SOLOs, DUOs, and TRIOs–and played the game in-situ under both First and Second price unit capacity auctions, with SOLOs outperforming groups. Second, we ran non-parametric simulations mixing professionals in groups of different size, in which bids were coupled with those registered during the in-situ sessions. Third, we ran non-parametric simulations in which the players were either 'rational machines' that bid according to Nash equilibrium or groups of 'professionals' of different size.

***Findings:*** The size of the decision group does matter. After the in-situ and the bootstrapped simulated games, the main result is that size is critical, and groups are not necessarily superior to individuals bidding alone. SOLOs bid closer to MACHINEs and lower than DUOs or TRIOs, while obtaining about the same number of units and higher payoffs than groups. Additionally, the 'degree of rationality' of the participants does also matter.

***Research limitations/implications:*** Even after applying the hybrid simulation methodology to increase sample size and allow for additional experimental settings, some of the scenarios are fictitious. Modification of the business game to allow for an even more realistic game could be implemented.

***Practical implications:*** After the hybrid simulation approach, the main implication of the paper is that to increase efficiency in resource allocation professionals should bid individually while using the theoretical knowledge of rational machines.

***Originality/value:*** To our knowledge, this is the first time that this double-experiment simulation methodology is used to analyze bidding behavior in auctions.

***Keywords:*** individual versus group decision-making, sequential capacity auctions, professional bidders, business games, non-parametric simulations

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