Mediating Customer Relationship Management On The Effect Of Incremental Innovation On Product Life Cycle

Erna Setijani, Sumartono, Pudjo Sugito

Abstract: This study aims to analyze the mediating customer relationship management on the effect of incremental innovation on product life cycle. The population of this study are batik entrepreneurs in Madura island, Indonesia. The sampling technique uses a proportional random sampling at three locations, namely: Bangkalan, Sampang, Pamekasan and Sumenep Regency. The number of respondents is 200 batik entrepreneurs. This research was carried out by designing questionnaire and testing the validity dan reliability of research instrument. Furthermore, the questionnaire was broadcasted to the batik entrepreneurs who were randomly selected. The primary data was analyzed using structural equation model with the Partial Least Square (PLS) data processing program. The result of this study demonstrates that incremental innovation affects customer relationship management, incremental innovation affects product life cycle, customer relationship management affects product lifecycle and incremental innovation affect indirectly product life cycle through customer relationship management. It means that both incremental innovation and customer management relationship can extend product life cycle of Madures Batik.

Index Terms: Incremental Innovation, Customer Relationship Management, Product Life Cycle

1NTRODUCTION

Batik is attached as a cultural part of several regions such as Solo, Yogyakarta, and Pekalongan. In East Java, Madura Island, besides being known as a salt island, has turned out to have a wealth of cultural sites, i.e. batik. The batik products produced in Madura have specialties such as motifs, striking colors and production processes. The variety of motifs owned by Madurese batik include spears, rhombus, knits, machetes, and various flora and fauna. Each Batik Handicraft Center in Madura island has craftsmen with their own characteristics. However, most of them are found in Bangkalan and Pamekasan Regencies. Some places include the Tanjung Bumi batik center in Bangkalan, the Banyumas Klampar batik center, Pamekasan, and the Pakandangan Sumenep batik center. The Government of the Pamekasan Regency has determined the Banyumas Klampar village in the Proppo sub-district as a batik village. It should be noted that the uniqueness of Madurese batik is in the manufacturing process. Batik Gentongan is one of the most famous batik traditions in Madura. It is quite well known for its color strength. The longer process of making batik gentongan, the more exclusive it will be. As a brand that represents Madura, Madurese batik can show the great side of the motifs, the manufacturing process and the philosophical meaning. This can make batik not only as a cultural product but also a heritage that needs to be preserved. Indonesia as a part of ASEAN countries has the potential of heritage tourism with the most market share (King, 2015). In a marketing perspective, management of this inheritance management in a professional and comprehensive manner can be used to maintain and preserve the authenticity of cultural heritage for future generations, while on the other hand, it can attract suppliers, distributors, regulators and consumers (Chhabra, 2010). Madurese batik brand as one of the cultural attractions plays an important role in the development of creative industries with positi Erna Setijani, Sumartono & Pudjo Sugito, Senior Lecturer at The Faculty of Economics & Business, University of Merdeka Malang, Indonesia. social impacts. The number of Madurese batik artisans is 200 in Sumenep, 592 in Pamekasan, 44 in Sampang and 1503 in Bangkalan 1503 (Ministry of Trade & Industry, Indonesia, 2018). Unfortunately, the marketing of Madurese batik products remains ups and downs. In fact, in the past three (3) years, it has stagnated and dropped. The results of preliminary studies indicate that Bangkalan Regency as the closest area to Suramadu which is a producer of high-quality batik, such as Batik Gentongan continues to decline in sales. Even, the existence of Batik Gentongan began to be disrupted by the existence of printing batik that can be produced quickly and has more innovative and varied designs. Meanwhile, While more Madurese Batik merely rely on striking colors and is far from being innovative; thus, it should be explored continuously from the motifs of the heritage of the Madurese people. The urgency of research activity on innovation, specifically the incremental innovation and customer relationship management (CRM) synergy in Madurese batik, is undeniable, with the hope of finding an adaptive innovation and CRM synergy model, in which when it is applied it contributes to the Madurese batik product life cycle (PLC). Therefore, this study intends to carry out study of the interrelationship between the principles of innovation, customer relationship management and product life cycle. Of course, The research results will provide many benefits in developing Madura batik and become a sustainable business entity.

2 LITERATURE REVIEW

2.1 Product Life Cycle

Kottler (2016) stated that the product life cycle has different periods in product sales. These periods connect to different opportunities and problems regarding marketing strategies and potential profits. By identifying periods that are different from the challenges of the different periods of a product being located, or the periods to be achieved, the company can better formulate marketing strategy. The periods of the product cycle consist of introduction, growth, establishment, and decline. During the introduction period, the product's novelty dictates that it will initially reach only low sales volumes and sluggish sales growth, during which the slope of the sales curve will continue relatively flat. If the product is successful, this early periods gives a way to the growth

period, during which the upward slope of the sales curve grows, as market penetration accelerates and the product gains acceptance with a lot of consumers. Over time, market saturation affects the product market to come into the maturity period, during which the sales curve flattens, and profit is generated predominantly by sales to old customers rather than to new customers.

2.2 Incremental Innovation

Chesbrough (2014) stated that incremental innovations include modification, improvement, simplification, consolidation, and improvement of existing products, processes, services, and production and distribution. Meanwhile, Rayna & Striukova (2016) stated that incremental innovation is an improvement and expansion of established designs that result in substantial prices or functional benefits. Effective innovation will contribute extremely to the competitiveness of firm. Meanwhile, the purpose of incremental innovation is to solve the intrinsic vagueness and it happens when a new feature is added, removed or substituted but leaving the whole set of products and services unchanged. Incremental improvements to the existing products, services and organizational routines can improve performance, quality, and usefulness and are crucial to make more competitively advanced products and services. This innovation is more apt to increase and extend the quality and added value of the existing products that will meet current customers' needs and certainly the organization will realize competitive organization. Both internal and external sources of resources are important to firms' performance and it is suggested that innovative performance can be jointly influenced by internal organizational proficiency.

2.3 Customer Relationship Management

Payne (2015) stated that customer relationship management (CRM) is the consolidation of customer management and creating business among companies. CRM is a double-edged sword, presenting opportunities and challenges for companies given their adoption and implementation. CRM is seen as rooted strongly in the concept of relationship marketing, aimed at increasing longterm profitability by switching from transaction-based marketing to customer retention (Pohludka & Štverková, 2019). In recent years, it has been acknowledged that company relationships with customers can be improved by using information technology (Farhan et al., 2018 ; Zahrotun, 2017) that can facilitate and improve customer relations in various ways but primarily enable companies to achieve adjustments, which are the core from a customer-centric organization (Saini & Kumar, 2015). In this context, CRM has emerged as an ideal vehicle for implementing relationship marketing within the company, with some practitioners suggesting that CRM provides a platform for operational manifestations of relationship marketing (Palioras & Siakas, 2017). The most appropriate way to implement CRM is through the use of software applications in the form of electronic customer relationship management (CRM) technology. This CRM software provides functionality that allows companies to make local customers point of all organizational decisions (Nunes et al., 2017) and such technological and Internet innovations are just a few of the several factors that now make relationships through one-on-one initiatives come true (Sönmez, 2018). The internet has allowed new intermediation patterns to emerge, enabled companies to adopt CRM to focus on effective customer relationship management and utilized the application of on-line technology to facilitate customer supplier relations (Yahoubi & Yavadi, 2017).

2.4 Previous Research

Lan (2017) suggested that CRM involves three stages, all of which are designed to manage the customer's life cycle and maximize customer lifetime value: getting new customers, increasing the profitability of the existing customers, and maintaining profitable customers for life. Restuccia et al. (2015), in an article entitled Product Life-Cycle Management and Distributors Contribution to New Product Development stated that innovation is an approach to extend product life cycle. Then, Zou et al (2016) in a research article on absorptive capacity, technological innovation, and product life cycles: a system dynamics model revealed that innovation has an effect on product life cycle. Brem, Maier & Wimschneider (2016), in an article entitled Competitive advantage through innovation: the case of Nespresso, revealed that innovation can build business continuity. Matsumoto et al. (2017) in an article entitled Sustainability Through Innovation in Product Life Cycle Design stated that innovation incrementally affects the life cycle of a product. Stock et al. (2017) in an article entitled A the model for the development of sustainable innovation for the early phase of the innovation process revealed that incremental innovation has an impact on the sustainability of the organization. Also, Janka et al. (2017), on the results of his research on Apple Products: A Discussion of the Product Life Cycle, revealed that incremental innovation as a medium extends product life. Similar opinion by Vaz et al. (2017), in an article entitled Sustainability and Innovation in the Automotive Sector: A Structured Content Analysis, revealed that incremental innovation is important in increasing competitiveness as well as in the product life cycle. Further, Bashir & Khawaja (2013), on the results of his research on The Relationship of CRM, Customer Satisfaction and Customer Loyalty, revealed that CRM has a positive relationship with customer satisfaction and loyalty. It means that electronic-based customer management can indirectly extend the product life cycle. Meanwhile, Dubihlela (2014) in his research article on Impact of CRM Implementation on Customer Loyalty, Customer Retention and Customer Profitability for Hoteliers along the Vaal Meander of South Africa further strengthened previous findings that e-CRM can indirectly extend the product life cycle period. Saini & Kumar (2015), in another research article about The Effect of CRM on Customer Satisfaction: An Empirical Study of Online Shopping, revealed that e-CRM directly affects customer satisfaction. Madson & Madson (2016), in their research article on Examining customer relationship management from a management fashion perspective, stated that electronic-based customer management has an influence on the realization of customer satisfaction. Bezhovski & Hussain (2016) in their article entitled The Benefits of Electronic Customer Relationship Management to the Banks and their Customers revealed that one of the benefits of electronic banking management is to increase customer satisfaction. Quresy et al. (2016), on the results of

his research on CRM for Competitive Advantage, found that empirically the implementation of information technology-based customer management contributes to the competitive advantage of the product. Janezka et al. (2016), in his article entitled the Implementation of CRM in Macedonian Companies obtained in its research activities that the implementation of IT-based customer relationship management contributes to increased sales. Then, Mang'unyi et al. (2017) in their research entitled The relationship between e-CRM and customer loyalty: a Kenyan Commercial Bank case study found that e-customer relationship management has a significant effect on customer loyalty. Then, Lan (2017) in his research article about Successful Factors of Implementation of Customer Relationship Management (CRM) on E-commerce Company revealed that the implementation of e-CRM has succeeded in increasing customer satisfaction which has an impact on the longer period of product life cycle. Yahoubi & Yavadi (2017), in the article entitled The impact of customer relationship management on organizational productivity, customer trust and satisfaction with the structural equation model: A study in the Iranian hospitals, revealed that there is an interrelation between IT-based customer management and customer trust as well as customer satisfaction. Nunes et al. (2017), in their research article on Customer relationship management in the agricultural machinery market, found that electronic-based customer relationship management is superior to conventional customer management in boosting sales. Furthermore, Wyne et al. (2017), in the article entitled Customer Relationship Management increase product market share.

2.5. Research Hypotheses

Based on the literature review and several previous research, hypotheses can be formulated as follows: (a) incremental innovation significantly affects product life cycle, (b) incremental innovation significantly affects customer relationship management, (c) customer relationship significantly affects product life cycle, and (d) incremental innovation indirectly affects product life cycle through customer relationship management.

3 RESEARCH METHODOLOGY

This study used a qualitative approach with survey and questionnaires as primary data collection tools. This study consists of 3 variables with operational definitions (a) incremental innovation is the activity of innovation which includes modification, refinement, simplification, consolidation, and multiplying existing products, processes, services, and production as well as distribution activities, (b) customer relationship management identifies the best customer of the company and maximizes the value of the customer by satisfying and maintaining it using information technology media, and (c) product life cycle describes the different stages in the history of selling a product. These stages relate to different opportunities and problems regarding marketing strategies and potential profits including introductory, growth, maturity and setback stages. The research population was batik craftsmen on Madura Island including Bangkalan, Sampang, Pamekasan and Sumenep Regencies. The sampling technique used proportional random sampling. Primary data collection techniques used questionnaires on a scale of 1-5. The sampling technique used a proportional random sampling of 200 batik artisans. The primary data was analyzed using structural equation modeling techniques with the Partial Leasquare data processing program, which began with the parameter test, followed with the validity &reliability tests. The rule of thumb is shown in the following table.

Table 1. *Parameter of validity & reliability measurement test*

Test	Parameters	Rule of Thumb
Convergent Validity	Loading factors	>0.50
	Average Variance Extracted	>0.40
Discriminant Validity	Cross Loading	>0.60
	Communality	>0.50
Reliability	Cronbach Alpha	>0.60
	Composite Reliability	>0.60
GoF: small = 0,1, GoF medium = 0,25 & GoF large = 0,38.		

Source: Harkiolakis (2017) & Kock (2013) Furthermore, after the measurement test was carried out and all parameters of the measurement model were declared robust, testing of good of fit (GoF) index and hypothesis testing were conducted. The good of fit index test on PLS-SEM used the Tenenhau standard (2014), if the value of GoF was small = 0.1, GoF medium = 0.25 and large GoF = 0.38. After that, the hypothesis test was conducted using the SmartPLS 3 Professional data processing program and hypothesis acceptance/rejection criteria where Probability (P) coefficient was less than 0.05 and t-statistic was greater than 1.96 (Harkiolakis, 2017).

4 RESULTS & DISCUSSION

4.1 Results

The result of validity and reliability test can be seen at path diagram below.

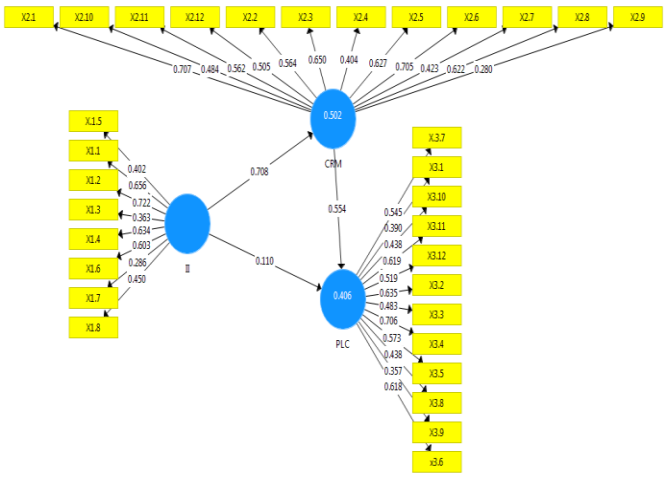

Figure 1. *Path Diagram 1*

Source: Processed Primary Data, 2019 As seen at Figure 1, there were thirteen loading factors of indicators that had to be dropped due to the coefficient values of x1.3, x1.5, x1.7 & x1.8 were less than 0.500. In addition, the coefficient values of x2.4, x2.7, x2.9 and x2.10 were less than 0.500.

Even, the coefficients values of x3.1, x3.3, x3.5, x3.8, x3.9 were less than 0.500 as well. Further, the model must be recalculated without those indicators. The result is shown at Figure 2 below.

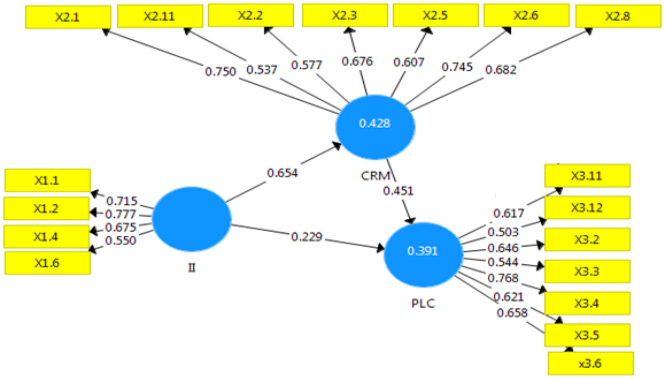

***Figure 2**. Path Diagram 2*

Source: Processed Primary Data, 2019 As shown at Figure 2, all loading factors were already higher than 0.50. Besides, the values of Cronbach's alpha were higher than 0.70, the values of rho_A were more than 0.70 and the values of Average Variance Extracted were also higher than 0.40. It means that research instrument is already valid and reliable.

***Table 2.** Construct Reliability and Validity*

Matrix	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted
CRM	0.783	0.797	0.841	0.433
II	0.619	0.641	0.777	0.469
PLC	0.741	0.778	0.814	0.461

Source: Processed Primary Data, 2019 Further, it is also supported by the values of discriminant validity at Table 3. The values of cross loading factors were higher than 0.60. Therefore, based on the result analysis, it can be concluded that the research instruments are valid and reliable. It means, further analysis can be conducted.

***Table 3**. Discriminant Validity*

	Fornell-Larcker Criteria	Cross Loadings	Hetertrait-Monotrait R.
	CRM	II	PLC
CRM	0.658		
II	0.654	0.685	
PLC	0.601	0.524	0.601

Source: Processed Primary Data, 2019 As can be seen at Table 6, 42.80% of customer relationship management was explained by incremental innovation and 39.10% of product life cycle was explained by incremental innovation and customer relationship management. The rest was due to other factors.

***Table 4.** R-Square*

Matrix	R Square	R Square Adjusted
CRM	0.428	0.422
PLC	0.391	0.379

Source: Processed Primary Data, 2019 Further, as shown at Table 5, all research hypotheses were accepted. as iws due to the p-values were less than 0.05. It means, customer relationship management affected product life cycle, incremental innovation affected customer relationship management, and incremental innovation affected significantly product life cycle as well.

***Table 5**. Path Coefficient*

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
CRM ->PLC	0.451	0.469	0.098	4.605	0.000
II ->CRM	0.654	0.658	0.053	12.424	0.000
II->PLC	0.229	0.234	0.114	2.005	0.045

Source: Processed Primary Data, 2019 Table 6 shows the specific indirect effect of incremental innovation on product life cycle through customer relationship management. From the table, it can be seen that p-value was less than 0.05. Therefore empirically, incremental innovation indirectly affected product life cycle through customer relationship management.

***Table 6.** Specific Indirect Effects*

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
II->CRM ->PLC	0.451	0.469	0.098	4.605	0.000

Source: Processed Primary Data, 2019 To analyze the nature of incremental innovation which indirectly influenced product life cycle through customer relationship management, the following table presents the total effect.

***Table 7.** Total Effects*

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
CRM ->PLC	0.451	0.469	0.098	4.605	0.000
II->CRM	0.654	0.658	0.053	12.424	0.000
II->PLC	0.524	0.542	0.072	7.288	0.000

Source: Processed Primary Data, 2019 However, based on table 7, the indirect effect was dummy. This was because all the p-values of total effect were less than 0.05.

4.2 Discussions

The research findings support several previous researches. Firstly, it is in line with Bashir & Khawaja (2013) in which there were relationships among customer relationship, customer satisfaction, product life cycle. Secondly, the results of this study strengthen a study by Janezka et al. (2016) and Janka et al. (2017) in which the implementation of e-CRM affected product life cycle. Besides, it is in line with Lan (2017) in which the implementation electronic customer relationship management (e-CRM) on E-commerce Company contributed to the extending of product life cycle. Besides, it is in line with Matsumoto et al. (2017) in which the implementation of incremental innovation affected Product Life Cycle. Also, it is in line with the opinion of Madson, D. & Madson, D. (2016) stating that customer relationship management influenced significantly product life cycle of fashion products. Even, it is similar to idea of Nunes et al. (2017) showing that customer relationship management extended product life cycle of agricultural product. In addition, it strengthens the research findings by Pohludka, M. & Štverková, H. (2019) stating that practice of CRM Implementation impacted the product life cycle of Small and Medium Sized Enterprises product. Interestingly, this research findings also support the idea of Quresy et al. (2016) in which the customer relationship management and incremental innovation contributed to competitive advantage and increased product life cycle. Additionally, similar to opinion of Rayna & Striukova (2016), incremental innovation can extend product life cycle. It also support the idea of Restuccia et al. (2015) showing that product life cycle Management should be concerned to innovation and customer management. Therefore, involvement of distributor is extremely important. Besides, it also supports the opinion by Saini & Kumar (2015) in their research article about the effect of e-CRM on customer satisfaction: an empirical study of online shopping. In addition, it is in line with Sönmez (2018) stating that customer relationship management systems played a significant role in maintain of product life cycle. It also supports Stock et al. (2017) stating that sustainable innovations like incremental innovation was extremely necessary to support product life cycle. It is also linear to research findings by Vaz et al. (2017) stating that business sustainability needed innovation in the automotive sectors. Besides, the results of this study are similar to statement of Wyne et al. (2017) showing that customer relationship management implementation affected sustainability of business organizations. It also strengthens Yahoubi & Yavadi (2017) in their artcle about the impact of the customer relationship management on organizational productivity, customer trust and satisfaction. It is also similar to idea of Zahrotun (2017) stating that implementation of data mining technique for customer relationship management created loyalty customer and sustainability. In addition, it supports an opinion by Zou et al. (2016) stated that that there was relationship between innovation and product life cycle.

5 CONCLUSIONS

Based on the research hypotheses test, incremental innovation affects significantly product life cycle, incremental innovation affects significantly customer relationship management, and customer relationship management affects significantly product life cycle and incremental innovation indirectly affects product life cycle through customer relationship management. It means that there are linkage among those research variables and customer relationship management mediates the effect of incremental innovation on product life cycle. This research findings can of course enrich the management science. This research was conducted in Indonesia. That is why generalization of the research findings just applies to Indonesian areas. Besides, further research is needed to be conducted particularly dealing with the main component of customer relationship management that contributes to the customer relationship management. By finding the components, it will of course be more beneficial to the management science and particularly. in the strategic management area.

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