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Customer Value Co-creation Behaviour in Indonesia Innovation Ecosystems MARIYUDia, M. SAYUTI*b, SURYADic, Hendra RAZAd, Faisal MATRIADle and IKRAMUDDINf a Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: mariyudi@unimal.ac.id b Department of Industrial Engineering, Faculty of Engineering Universitas Malikussaleh, Aceh, Indonesia; Email: sayuti_m@unimal.ac.id c Department of Agribusiness, Faculty of Agriculture Universitas Malikussaleh, Aceh, Indonesia; Email: suryadi_zulkifli@yahoo.com d Department of Accounting, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: hendra.raza@yahoo.com e Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: faisalmatriadi@gmail.com f Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: ikramuddin@unimal.ac.id

Abstract Mobile payment systems are becoming an integral part of innovation ecosystems with the aim of encouraging people to engage in value co-creation. This study proposes a model for co-creation behaviour in Indonesia innovation ecosystems. A total of 350 respondents were surveyed through a self-administered questionnaire at the hand of a convenience sampling technique. The hypotheses in the study were assessed through structural equation modelling (SEM) through AMOS software.

The study results revealed that out of 13 hypotheses developed during the study, 11 of them were very strongly supported, and 2 unsupported. The findings in this study indicate that the model provides a scale for validation of co-creation behaviour based on the identified environmental factor and brand loyalty. Keywords: value co-creation; brand loyalty; mobile payment and innovation ecosystems INTRODUCTION Managing high innovation practices and the complexity of technological systems now requires a better understanding of the improved organizational structure and the surrounding environment.

Recently, many scholars turned their attention to the phenomenon of developing and commercializing innovations that different labels, such as innovation networks (e.g. Lee et al., 2015) or open innovation (e.g., Chesbrough, 2003). To address the process of complex joint value creation, several scholars proposed and

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developed the concept of innovation ecosystem (e.g., Adner and Kapoor, 2016; Adner, 2006), which draws upon the former concept business ecosystem (Moore, 1993).

The development of the concept of innovation ecosystems associated with the relevance and ?exibility of concept in the entrepreneurship literature, strategy, and business are also increasingly rapid, such as platform-based ecosystem (e.g., Gawer, 2014), hub ecosystems (e.g., Nambisan & Baron, 2013), open innovation ecosystem (e.g., Chesbrough et al., 2014), digital innovation ecosystem (e.g., Rao & Jimenez, 2011). On the other hand, the literature a very fragmented, diverse theory and does not provide a robust de? nition about the innovation ecosystem (e.g., Oh et al.,

2016; Overholm, 2015; Nambisan & Baron, 2013; Gawer & Cusumano, 2014; Valkokari, 2015) making it difficult to compare and consolidate knowledge. Currently, there are many online platforms that provide social network-based service delivery systems that are part of the service ecosystem in creating value co-creation that aims to create service value, increase customer knowledge and expertise (Zhang et al., 2015; Xie, Bagozzi, & Troye 2008; Vargo & Lusch 2008; Svensson & Gr?nroos, 2008; Payne, Storbacka & Frow, 2008; Rowley et al., 2007).

One of the main concepts of S-D logic is that the customers are the active player in the co-creation process (Xie, Bagozzi, & Troye 2008) and the co-creator of value (Payne et al., 2008; Vargo & Lusch, 2008). Customer value co-creation comprises of Customer Participation Behaviour (CPB) (Yi & Gong, 2008) and Customer Citizenship Behaviour (CCB) (Yi et al, 2011; Yi & Gong, 2013). The results of previous studies concluded that the co-creation experiences influence customer's future participation on social media sites (Zhang et al.,

2015) and retail (Shamim & Ghazali, 2014; Neghina et al., 2014; Tommasetti et al., 2015). In the digital age, mobile payments are a real-time exchange of values between consumers and actors in business networks (Szmigin & Foxall, 1998; Milne, 2006; Berger et al., 1996) and digital ecosystems (Moore, 1993, 1996; Feij?o et al., 2009; Corallo et al., 2007; Gaur et al., 2013). In mobile payment ecosystems (Zhong et al., 2011; Kendall et al., 2011; Contini et al.,

2011; Gaur & Ondrus, 2012) numerous innovative payment services (eg, mobile wallets) conduct "exchange of values" (Hughes & Lonie, 2007; Allen et al., 2002), provide innovative payment services directly to consumers and traders (Allen & Santomero, 1997) and providing transaction balances (Llewellyn, 1996; Ert?rk & ?zg?r, 2014; Edwards & Mishkin, 1995; Bond, 2004). The Indonesian government has focused on financial inclusion in recent years. The level of financial account ownership has increased significantly from 20 percent in 2011, to 36 percent in 2014 and 49 percent in 2017 (Demirguc-Kunt et al.,

2018; World Bank, 2018) has also been supported by the penetration of telecommunication and internet devices reached 143,260,000 of internet users in 2017 (APJII, 2017). Around 75 percent of the online buys are made through cellphones (Nuryakin et al., 2019). Digital currency is a digital representation of value. It consists of centralized virtual currency, which has a centralized repository and a central administrator (e.g., PayPal, Alipay, Go-Pay, Telkomsel T Cash, Bank Mandiri e-cash BCA Sakuku, XL Tunai, PayPro, BBM Money, Doku Wallet, OVO, Rekening Ponsel CIMB Nlaga, Mandiri E-money, BCA Flazz, BRI Brizzi, BNI

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TapCash, MegaCash, Bank DKI JakCard, Nobu E-money and BTN Blink), and decentralized virtual currency, namely cryptocurrency (e.g.,

Bitcoin and Litecoin). This paper contributes conceptually to the literature and the main concepts in the service ecosystem domain, S_D logic, Uses and Gratification theory (U&G) (Luo, 2002) and Stimulus-Organism-Response (S-O-R) Model (Mehrabian & Russell, 1974). HYPOTHESES AND CONCEPTUAL DEVELOPMENT Environmental Factors in Co-creation The SOSNs (i.e.

service ecosystems) itself is defined as the environment supporting the important digital innovations in digital businesses in which economic and social actors are connected by mutual value creation and interactions (Lusch & Nambisan, 2015; Lusch et al., 2010). For generality, we use the term user that encompasses customers that involve co-creation activities beyond service or product consumption toward service exchange and co-creation behaviour, including: platform characteristics, environmental characteristics, and value exchange (Lusch & Nambisan, 2015).

This paper follows the overall view of Lusch and Nambisan (2015), regarding how service innovation (that includes co-creation) happens in the innovation ecosystems. Co-creation behaviour occurs as users have the ability to collaborate and provide co-creation value to stakeholders. Hence, the co-created value extracted from the delivered service is highly influenced by the characteristics of the environment, such as Network Structure (Lusch & Nambisan, 2015; Kane et al., 2014, Edvardsson et al., 2011), Service Platform Capabilities (Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al.,

2014), Roles (Edvardsson et al., 2011; Vargo & Lusch, 2008; Hoyer et al., 2010; Romero & Molina, 2011), Social Influence (Anagnostopoulos et al., 2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014).

Thus: H1: The environmental factor network structure contributes to participation behaviour. H2: The environmental factor platform capabilities contribute to participation behaviour. H3: The environmental factor role of users contributes to participation behaviour. H4: The environmental factor social influence contributes to participation behaviour.

H5: The environmental factor network structure contributes to citizenship behaviour. H6: The environmental factor platform capabilities contribute to citizenship behaviour. H7: The environmental factor role of users contributes to citizenship behaviour. H8: The environmental factor social influence contributes to citizenship behaviour. Co-creation and brand loyalty Loyalty can have multiple objects, such as loyalty to the service firm, loyalty to the store, and loyalty to the brand.

In other words, to retailers, it means loyalty to the manufacturer, to the store, it means loyalty to his brand. Brand loyalty more than just one simple dimension, on the contrary, this is a complex multi-dimensional concept (Oliver, 1999). The initial studies of loyalty were focused on a unidimensional construct (Guest, 1944; Cunningham, 1961). Later, many researchers integrated both attitudinal and behavioral to become composite loyalty (Jacoby, 1971).

Due to its complexity, loyalty has been measured and defined in many different ways. Many researchers

generally agree that loyalty consists of both attitudinal and behavioral dimensions as the multi-dimensional approach (Oliver, 1999, 1997; Wilkie, 1994; Dick & Basu, 1994) that loyalty evolves in stages called the Four-Stage Loyalty Model (Oliver, 1999). This study defines customer brand as the customer's positive response to the brand in various levels of attitudinal loyalty that translates into behavioral loyalty based on Oliver's Four-Stage Loyalty Model. Many researchers have empirically tested this multi-dimensional approach (e.g., East et al., 2005; Hennig-Thurau et al.,

2004; Caruana, 2002; Zeithaml et al., 1996; Mariyudi & Matriadi, 2017). Hence, consumers can be both, attitudinally and behaviourally loyal to a brand. In the context of the research, we define co-creation as the active participation and active cooperation of the Indonesian buyers with mobile payment such as in the process of new product design and sharing product designs ideas to a specific virtual environment. Likewise, the companies have certain benefits from co-creation as well. One of those is an increase in brand loyalty (Mathwick et al., 2007; Franke et al., 2009).

This research will focus on exploring to what extent product co-creation activity would influence attitudinal and behavioral loyalty in the Indonesian innovation ecosystems toward a particular product brand. Thus: H9: Customer's participation behaviour in co-creation activity contributes to the attitudinal loyalty H10: Customer's citizenship behaviour in co-creation activity contributes to the attitudinal loyalty H11: Customer's participation behaviour in co-creation activity contributes to the behavioural loyalty H12: Customer's citizenship behaviour in co-creation activity contributes to the behavioural loyalty H13: Attitudinal loyalty contributes to the behavioural loyalty The literature review identified three main concepts.

Accordingly, we investigate whether environmental factors affecting value co-creation behavior and brand loyalty in the Indonesian innovation ecosystems. The derived conceptual model is represented in figure 1. Fig. 1. Conceptual model METHODS All in all, 500 respondents were personally approached and willing to respond to the questionnaire. Of the 500 questionnaires distributed, 375 (75%) were returned.

A further sixteen were not usable, and 350 (70%) questionnaires were subsequently utilized giving an effective ?nal survey response rate (Sekaran, 2005). This research used a self-administered questionnaire (Zikmund & Babin, 2007) thorough literature review and constituted a 5-point Likert scale The survey instrument adopted in this study is based on a critical review of the past studies, Environmental factors (Bidar et al., 2016), Value Co-creation Behaviour (Durugbo & Pawar, 2014; Lorenzo-Romero et al., 2014; Shamim & Ghazali, 2014), and brand loyalty (Oliver, 1999).

The psychometric measurements in the scales that were utilized were reckoned to be fitting as they exceeded the threshold of 0.6 with Cronbach's alpha statistics of between 0.67 and 0.75 values. The data were analyzed in two ways, namely, descriptive and inferential analyses. Statistical Package for Social Sciences (SPSS) Version 25 and Analysis of Moment Structures (AMOS Version 25.0) were used as analytical software to simultaneously investigate a series of interrelated relationships among the measured variables and several latent constructs (Hair et al.,

2014), to examine assumptions for multivariate analysis (Kline, 2005), and to present an overall test of model

fit and individual parameter estimate tests simultaneously (Hair et al., 2014). RESULTS Preliminary analysis results in screening for missing data, outliers, and normality (kurtosis and skewness) showed that no significant inconsistencies in the data were identified. Information on the respondents' demographic attributes was from a total of 350 respondents, 48% were male and 52% were female.

There were 70 % single respondents and 29.14% married respondents, while others were 0.86%. In terms of specifying age, there was the majority or 60.86% of the respondents were between 31 and 40 years old. This was followed by 26.57%, which were between 41 and 50 years old. While 7.14% of the respondents were above 60 years old, which are summarized in Table 1. Table 1. Demographic characteristics

Characteristics	Frequency	Percentage
Gender		
Male	168	48.00%
Female	182	52.00%
Marital status		
Single	245	70.00%
Married	102	29.14%
Others	3	0.86%
Educational level		
Primary	1	0.29%
Secondary	12	3.43%
College (Certificate/Diploma)	147	42.00%
College/University degree	178	50.86%
Post grad degree (Master/PhD)	12	3.43%
Age		
21	8	2.29%
31	213	60.86%
41	93	26.57%
51	11	3.14%
61	7	2.14%

To determine the outliers, the Mahalanobis distance (d2) measure was used to assess multivariate outliers (Kline, 2005).

There were a total of 10 questionnaires that were eliminated due to the outliers. After eliminating 6 questionnaires that were incomplete and another 10 questionnaires due to the outliers, a total of 350 samples for analysis. All the data fell within the range of normality assumptions and not exhibit any nonlinear patterns. Measurement Model The measurement of the proposed research model, including the variables of environmental factor network structure, environmental factor service platform capabilities, environmental factor role of users, environmental factor social influence, participation behaviour in co-creation activity, citizenship behaviour in co-creation activity, attitudinal loyalty, and behavioural loyalty.

Data were analyzed for convergence through Cronbach's coefficient alpha (α) scores and all the values exceeded the threshold of 0.7 signifying significant convergence. The result shows Cronbach's coefficient values ranging between 0.874 and 0.921 which specify significant reliability. CR values exceeding 0.7 and AVE values were greater than 0.5 areas viewed as satisfactory for internal consistency (Hair et al., 2014; Fornell & Lacker, 1981). The absolute fit indices of the RMSEA (0.027) and GFI (0.978) indicate a good fit. The incremental fit indices of CFI (0.901), TLI (0.923), and AGFI (0.968) also indicate a good fit and meet the recommended values.

Structural Equation Modelling In order to examine the hypothesized relationships pertaining to environmental factors affecting value co-creation behavior and brand loyalty in the Indonesian innovation ecosystems, a path analysis approach in structural equation modelling (SEM) was done (Hair et al., 2014). Testing the structural research model was used to test the thirteen causal paths reflecting Hypothesis 1 to Hypothesis 13. Figure 2 presents the result of testing the structural research model. Fig. 2.

Structural model Figure 2 demonstrates that all of the goodness-of-fit indexes was deemed satisfactory (χ^2/df : 2.128, RMSEA: 0.065, GFI: 0.899, CFI: 0.945, NFI: 0.937, PGFI: 0.688). Thus, the result of testing the structural research model was acceptable. Based on this model, the relationships between the constructs as listed in the hypotheses statements are shown in Table 2. Figure 2 and Table 1 show the results. Out of the 13 hypotheses, 11 were supported except for 2 (H3 and H11).

The standardized estimate coefficient (β) of all paths tested in the structural model was significant. However, Hypothesis 3 and 11 were not supported as the standardized estimate (β) was not as expected, negative and not significant. (Hair et al., 2010). In addition, the structural model also reveals that the explanatory power (R^2) of determinant variables on endogenous variables was relatively high, customer's participation behaviour = 77.1%, customer's citizenship behaviour = 75.1%, attitudinal loyalty= 69.7%, and behavioural loyalty = 67.5%. Table 2.

Results of path coefficients and hypothesis testing

Hypothesis	Relationship	Std. Estimate	Critical Ratio	Supported
H1	Environmental factor network structure --> Participation behaviour	0.354	4.121***	Yes
H2	Environmental factor service platform capabilities --> participation behaviour	0.400	5.734***	Yes
H3	Environmental factor role of users --> Participation behaviour	-0.086	1.051 (ns)	No
H4	Environmental factor social influence --> Participation behaviour	0.110	2.043**	Yes
H5	Environmental factor network structure --> Citizenship behaviour	0.147	2.166**	Yes
H6	Environmental factor service platform capabilities --> Citizenship behaviour	0.176	2.113**	Yes
H7	Environmental factor role of users --> Citizenship behaviour	0.136	1.831**	Yes
H8	Environmental factor social influence --> Citizenship behaviour	0.452	5.036***	Yes
H9	Customer's participation behaviour --> Attitudinal loyalty	0.408	3.648***	Yes
H10	Customer's citizenship behaviour --> Attitudinal loyalty	0.588	16.887***	Yes
H11	Customer's participation behaviour --> Behavioural loyalty	-0.051	0.591 (ns)	No
H12	Customer's citizenship behaviour --> Behavioural loyalty	0.162	4.335***	Yes
H13	Attitudinal loyalty --> Behavioural loyalty	0.080	1.299*	Yes

Note: ***p< 0.01, **p< 0.05, *p< 0.1,

ns = not supported

DISCUSSIONS This section will analyze the research results and discusses the contribution this research makes to academic theory and managerial practice. As we can see in the final research model, not all latent constructs are consistent with the literature. Rather, environmental factor role of users and customer's participation behaviour were found to have no direct relationship with behavioural loyalty. Instead, they all influenced attitudinal loyalty through another construct in a direct way.

The results of this study indicate that the environmental factor network structure, environmental factor platform capabilities and environmental factor social influence is a direct path and is a factor that significantly influences participation behaviour in co-creation activity. These findings support H1, H2, and H4, which means the findings are consistent with previous research studies (Lusch & Nambisan, 2015; Kane et al., 2014, Edvardsson et al., 2011; Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al., 2014; Anagnostopoulos et al.,

2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014). The structure of a network is the way Indonesian buyers with mobile payment are connected to each other within the network. Indonesian buyers with mobile payment create the structure with others based on shared competences, information resources, and relationships. The type of connectivity (interactions, relations, proximities, flows) and ties characteristics (strength, affect, degree, symmetry) that form the structure, affect network formation, with implications for the platform's design and consequently influence the behaviour and dynamics of network.

Moreover, the result of data analysis shows that environmental factor network, environmental factor platform capabilities, environmental factor role of users, and environmental factor social influence is a direct path and is

a factor that significantly influences citizenship behavior in co-creation activity. These findings support H5, H6, H7, and H8, which means the findings are consistent with previous research studies (Lusch & Nambisan, 2015; Kane et al., 2014; Edvardsson et al., 2011; Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al., 2014; Edvardsson et al., 2011; Vargo & Lusch 2008; Hoyer et al.,

2010; Romero & Molina, 2011; Anagnostopoulos et al., 2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014). In co-creation users deliver the service and co-create the value. The role of user refers to □ socially defined expectations of individuals □ behaviours, in particular, social positions □. According to S-D logic, all economic and social users adopt the role of resource integrators rather than the individual user.

Value is co-created during interactions between providers and beneficiaries through the integration of resources and the application of competencies. On the other hand, customer's participation behaviour in co-creation activity and customer's citizenship behavior in co-creation activity influence is a direct path and is a factor that significantly influences attitudinal loyalty. Customer's citizenship behavior in co-creation activity and attitudinal loyalty influence is a direct path and is a factor that significantly influences behavioural loyalty. Thus, the hypotheses H9, H10, H12, and H13 were supported, which means the findings are consistent with previous research studies (Franke et al.,

2009; Mathwick et al., 2007; East et al., 2005; Hennig-Thurau et al., 2004; Caruana, 2002; Zeithaml et al., 1996; Mariyudi & Matriadi, 2017). According to the recent marketing strategy literature, value co-creation strategy as active engagement of target customers in the process of value creation to reinforces customers' loyalty. Our results have provided any empirical support that the Indonesian buyer's participation in co-creation activity positively influences customers' loyalty toward mobile payment brands. Therefore, we conclude that co-creation activity in Indonesian buyers with mobile payment automatically influences customers' loyalty.

This study contributes to the literature on the four stages of the Oliver's Model in Indonesia Innovation Ecosystems. The research confirms that customer loyalty consists of both attitudinal and behavioral aspects. Customer loyalty evolves in stages and it is a multidimensional approach, the study supports attitude-behavior relationship theory (Fishbein & Ajzen, 1975). CONCLUSION The study highlighted that the environmental factor network structure, environmental factor platform capabilities and environmental factor social influence is a direct path and is a factor that significantly influences participation behaviour in co-creation activity.

Moreover, the result of data analysis shows that environmental factor network, environmental factor platform capabilities, environmental factor role of users, and environmental factor social influence is a direct path and is a factor that significantly influences citizenship behavior in co-creation activity. Finally, the customer's participation behaviour in co-creation activity and customer's citizenship behavior in co-creation activity influence is a direct path and is a factor that significantly influences attitudinal loyalty.

Customer's citizenship behavior in co-creation activity and attitudinal loyalty influence is a direct path and is a factor that significantly influences behavioural loyalty. Involving customers to co-create value and user engagement in co-creation activities is an important new marketing strategy for any company. Managers abandoned the traditional product-centric value by engaging customers, in order to produce products that will fulfill customers' needs, effectiveness, increase productivity, and will lead to brand loyalty. The complex

multi-dimensional concept of brand loyalty plays an important role in the longterm stability of any company.

Hence, in order to ensure a continuous stream of revenue, mobile payment companies should understand, how to achieve that customers develop a favorable attitude toward their brand, which they will purchase consistently in the future. . LIMITATIONS AND FUTURE RESEARCH This research represents an important step in understanding Customer Value Co-creation Behaviour the buyers with mobile payment in Indonesia Innovation Ecosystems. There are a few limitations to the study.

Firstly, and perhaps the most important, this conceptual research-based focused mainly on the durable goods industry which is not entirely in line with the service sector. The results may have been more encouraging, further research is necessary to base on previous studies carried out in the mobile payment ecosystems. Secondly, this study fails to fully explain the antecedents of the Indonesian buyer's participation in co-creation activity in the mobile payment ecosystems in full extent, since not all possible contributing factors were examined.

Other factors related to customer or to company may also have a significant effect of customers' participation in co-creation activity such as openness, uniqueness of problem, clarity of task, trust and rapport, commitment to common goals, customers' expertise, etc. (Auh et al., 2007; Hakanen & Jaakkola, 2012). However, these factors were beyond the scope of our study. Acknowledgment: We would like to give special thanks to Advanced Knowledge and Skill for Sustainable Growth Project in Indonesia - Asian Development Bank (AKSI-ADB) Universitas Malikussaleh for a part of financial support of the research, is gratefully acknowledged. References Lee, S., Nam, Y., Seonmi, S., & Son, H., (2015).

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Customer Value Co-creation Behaviour in Indonesia Innovation Ecosystems MARIYUDI^a, M. SAYUTI^{*b}, SURYADI^c, Hendra RAZA^d, Faisal MATRIADI^e and IKRAMUDDIN^f a Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: mariyudi@unimal.ac.id b Department of Industrial Engineering, Faculty of Engineering Universitas Malikussaleh, Aceh, Indonesia; Email: sayuti_m@unimal.ac.id c Department of Agribusiness, Faculty of Agriculture Universitas Malikussaleh, Aceh, Indonesia; Email: suryadi_zulkifli@yahoo.com d Department of Accounting, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: hendra.raza@yahoo.com e Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: faisalmatriadi@gmail.com f Department of Management, Faculty of Economics and Business Universitas Malikussaleh, Aceh, Indonesia; Email: ikramuddin@unimal.ac.id Abstract Mobile payment systems are becoming an integral part of innovation ecosystems with the aim of encouraging people to engage in value co-creation.

This study proposes a model for co-creation behaviour in Indonesia innovation ecosystems. A total of 350 respondents were surveyed through a self-administered questionnaire at the hand of a convenience sampling technique. The hypotheses in the study were assessed through structural equation modelling (SEM) through AMOS software.

The study results revealed that out of 13 hypotheses developed during the study, 11 of them were very strongly supported, and 2 unsupported. The findings in this study indicate that the model provides a scale for validation of co-creation behaviour based on the identified environmental factor and brand loyalty.

Keywords: value co-creation; brand loyalty; mobile payment and innovation ecosystems

INTRODUCTION Managing high innovation practices and the complexity of technological systems now requires a better understanding of the improved organizational structure and the surrounding environment. Recently, many scholars turned their attention to the phenomenon of developing and commercializing innovations that different labels, such as innovation networks (e.g. Lee et al., 2015) or open innovation (e.g., Chesbrough, 2003).

To address the process of complex joint value creation, several scholars proposed and developed the concept of innovation ecosystem (e.g., Adner and Kapoor, 2016; Adner, 2006), which draws upon the former concept business ecosystem (Moore, 1993). The development of the concept of innovation ecosystems associated with the relevance and ?exibility of concept in the entrepreneurship literature, strategy, and business are also increasingly rapid, such as platform-based ecosystem (e.g., Gawer, 2014), hub ecosystems (e.g.,

Nambisan & Baron, 2013), open innovation ecosystem (e.g., Chesbrough et al., 2014), digital innovation ecosystem (e.g., Rao & Jimenez, 2011). On the other hand, the literature a very fragmented, diverse theory and does not provide a robust definition about the innovation ecosystem (e.g., Oh et al., 2016; Overholm, 2015; Nambisan & Baron, 2013; Gawer & Cusumano, 2014; Valkokari, 2015) making it difficult to compare and consolidate knowledge.

Currently, there are many online platforms that provide social network-based service delivery systems that are part of the service ecosystem in creating value co-creation that aims to create service value, increase customer knowledge and expertise (Zhang et al., 2015; Xie, Bagozzi, & Troye 2008; Vargo & Lusch 2008; Svensson & Grönroos, 2008; Payne, Storbacka & Frow, 2008; Rowley et al., 2007).

One of the main concepts of S-D logic is that the customers are the active player in the co-creation process (Xie, Bagozzi, & Troye 2008) and the co-creator of value (Payne et al., 2008; Vargo & Lusch, 2008). Customer value co-creation comprises of Customer Participation Behaviour (CPB) (Yi & Gong, 2008) and Customer Citizenship Behaviour (CCB) (Yi et al, 2011; Yi & Gong, 2013). The results of previous studies concluded that the co-creation experiences influence customer's future participation on social media sites (Zhang et al.,

2015) and retail (Shamim & Ghazali, 2014; Neghina et al., 2014; Tommasetti et al., 2015). In the digital age, mobile payments are a real-time exchange of values between consumers and actors in business networks (Szmigin & Foxall, 1998; Milne, 2006; Berger

et al., 1996) and digital ecosystems (Moore, 1993, 1996; Feijóo et al., 2009; Corallo et al., 2007; Gaur et al., 2013). In mobile payment ecosystems (Zhong et al.,

2011; Kendall et al., 2011; Contini et al., 2011; Gaur & Ondrus, 2012) numerous innovative payment services (eg, mobile wallets) conduct "exchange of values" (Hughes & Lonie, 2007; Allen et al., 2002), provide innovative payment services directly to consumers and traders (Allen & Santomero, 1997) and providing transaction balances (Llewellyn, 1996; Ertürk & Özgür, 2014; Edwards & Mishkin, 1995; Bond, 2004). The Indonesian government has focused on financial inclusion in recent years.

The level of financial account ownership has increased significantly from 20 percent in 2011, to 36 percent in 2014 and 49 percent in 2017 (Demirguc-Kunt et al., 2018; World Bank, 2018) has also been supported by the penetration of telecommunication and internet devices reached 143,260,000 of internet users in 2017 (APJII, 2017). Around 75 percent of the online buys are made through cellphones (Nuryakin et al., 2019). Digital currency is a digital representation of value.

It consists of centralized virtual currency, which has a centralized repository and a central administrator (e.g., PayPal, Alipay, Go-Pay, Telkomsel T Cash, Bank Mandiri e-cash BCA Sakuku, XL Tunai, PayPro, BBM Money, Doku Wallet, OVO, Rekening Ponsel CIMB Nlaga, Mandiri E-money, BCA Flazz, BRI Brizzi, BNI TapCash, MegaCash, Bank DKI JakCard, Nobu E-money and BTN Blink), and decentralized virtual currency, namely cryptocurrency (e.g.,

Bitcoin and Litecoin). This paper contributes conceptually to the literature and the main concepts in the service ecosystem domain, S-D logic, Uses and Gratification theory (U&G) (Luo, 2002) and Stimulus-Organism-Response (S-O-R) Model (Mehrabian & Russell, 1974).

HYPOTHESES AND CONCEPTUAL DEVELOPMENT Environmental Factors in Co-creation The SOSNs (i.e. service ecosystems) itself is defined as the environment supporting the important digital innovations in digital businesses in which economic and social actors are connected by mutual value creation and interactions (Lusch & Nambisan, 2015; Lusch et al., 2010).

For generality, we use the term user that encompasses customers that involve co-creation activities beyond service or product consumption toward service exchange and co-creation behaviour, including: platform characteristics, environmental characteristics, and value exchange (Lusch & Nambisan, 2015). This paper follows the overall view of Lusch and Nambisan (2015), regarding how service innovation (that

includes co-creation) happens in the innovation ecosystems.

Co-creation behaviour occurs as users have the ability to collaborate and provide co-creation value to stakeholders. Hence, the co-created value extracted from the delivered service is highly influenced by the characteristics of the environment, such as Network Structure (Lusch & Nambisan, 2015; Kane et al., 2014, Edvardsson et al., 2011), Service Platform Capabilities (Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al.,

2014), Roles (Edvardsson et al., 2011; Vargo & Lusch, 2008; Hoyer et al., 2010; Romero & Molina, 2011), Social Influence (Anagnostopoulos et al., 2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014). Thus: H1: The environmental factor network structure contributes to participation behaviour. H2: The environmental factor platform capabilities contribute to participation behaviour.

H3: The environmental factor role of users contributes to participation behaviour. H4: The environmental factor social influence contributes to participation behaviour. H5: The environmental factor network structure contributes to citizenship behaviour. H6: The environmental factor platform capabilities contribute to citizenship behaviour. H7: The environmental factor role of users contributes to citizenship behaviour.

H8: The environmental factor social influence contributes to citizenship behaviour.

Co-creation and brand loyalty Loyalty can have multiple objects, such as loyalty to the service firm, loyalty to the store, and loyalty to the brand. In other words, to retailers, it means loyalty to the manufacturer, to the store, it means loyalty to his brand.

Brand loyalty more than just one simple dimension, on the contrary, this is a complex multi-dimensional concept (Oliver, 1999). The initial studies of loyalty were focused on a unidimensional construct (Guest, 1944; Cunningham, 1961). Later, many researchers integrated both attitudinal and behavioral to become composite loyalty (Jacoby, 1971).

Due to its complexity, loyalty has been measured and defined in many different ways. Many researchers generally agree that loyalty consists of both attitudinal and behavioral dimensions as the multi-dimensional approach (Oliver, 1999, 1997; Wilkie, 1994; Dick & Basu, 1994) that loyalty evolves in stages called the Four-Stage Loyalty Model (Oliver, 1999).

This study defines customer brand as the customer's positive response to the brand in various levels of attitudinal loyalty that translates into behavioral loyalty based on Oliver's Four-Stage Loyalty Model. Many researchers have empirically tested this multi-dimensional approach (e.g., East et al., 2005; Hennig-Thurau et al., 2004; Caruana,

2002; Zeithaml et al., 1996; Mariyudi & Matriadi, 2017). Hence, consumers can be both, attitudinally and behaviourally loyal to a brand.

In the context of the research, we define co-creation as the active participation and active cooperation of the Indonesian buyers with mobile payment such as in the process of new product design and sharing product designs ideas to a specific virtual environment. Likewise, the companies have certain benefits from co-creation as well. One of those is an increase in brand loyalty (Mathwick et al., 2007; Franke et al., 2009).

This research will focus on exploring to what extent product co-creation activity would influence attitudinal and behavioral loyalty in the Indonesian innovation ecosystems toward a particular product brand. Thus: H9: Customer's participation behaviour in co-creation activity contributes to the attitudinal loyalty H10: Customer's citizenship behaviour in co-creation activity contributes to the attitudinal loyalty H11: Customer's participation behaviour in co-creation activity contributes to the behavioural loyalty H12: Customer's citizenship behaviour in co-creation activity contributes to the behavioural loyalty H13: Attitudinal loyalty contributes to the behavioural loyalty The literature review identified three main concepts.

Accordingly, we investigate whether environmental factors affecting value co-creation behavior and brand loyalty in the Indonesian innovation ecosystems. The derived conceptual model is represented in figure 1. Fig. 1. Conceptual model METHODS All in all, 500 respondents were personally approached and willing to respond to the questionnaire.

Of the 500 questionnaires distributed, 375 (75%) were returned. A further sixteen were not usable, and 350 (70%) questionnaires were subsequently utilized giving an effective ?nal survey response rate (Sekaran, 2005). This research used a self-administered questionnaire (Zikmund & Babin, 2007) thorough literature review and constituted a 5-point Likert scale The survey instrument adopted in this study is based on a critical review of the past studies, Environmental factors (Bidar et al.,

2016), Value Co-creation Behaviour (Durugbo & Pawar, 2014; Lorenzo-Romero et al., 2014; Shamim & Ghazali, 2014), and brand loyalty (Oliver, 1999). The psychometric measurements in the scales that were utilized were reckoned to be ?tting as they exceeded the threshold of 0.6 with Cronbach's alpha statistics of between 0.67 and 0.75 values. The data were analyzed in two ways, namely, descriptive and inferential analyses.

Statistical Package for Social Sciences (SPSS) Version 25 and Analysis of Moment Structures (AMOS Version 25.0) were used as analytical software to simultaneously

investigate a series of interrelated relationships among the measured variables and several latent constructs (Hair et al.,

2014), to examine assumptions for multivariate analysis (Kline, 2005), and to present an overall test of model fit and individual parameter estimate tests simultaneously (Hair et al., 2014). RESULTS Preliminary analysis results in screening for missing data, outliers, and normality (kurtosis and skewness) showed that no significant inconsistencies in the data were identified. Information on the respondents' demographic attributes was from a total of 350 respondents, 48% were male and 52% were female.

There were 70 % single respondents and 29.14% married respondents, while others were 0.86%. In terms of specifying age, there was the majority or 60.86% of the respondents were between 31 and 40 years old. This was followed by 26.57%, which were between 41 and 50 years old. While 7.14% of the respondents were above 60 years old, which are summarized in Table 1. Table 1.

Demographic characteristics

Characteristics variables	Frequency	Percentage
Gender		
Male	168	48.00%
Female	182	52.00%
Marital status		
Single	245	70.00%
Married	102	29.14%
Others	3	0.86%
Educational level		
Primary	1	0.29%
Secondary	12	3.43%
College (Certificate/Diploma)	147	42.00%
College/University degree	178	50.86%
Post grad degree (Master/PhD)	12	3.43%
Age		
21 – 30	8	2.29%
31 – 40	213	60.86%
41 – 50	93	26.57%
51 – 60	11	3.14%
61 – 70	25	7.14%

To determine the outliers, the Mahalanobis distance (d2) measure was used to assess multivariate outliers (Kline, 2005).

There were a total of 10 questionnaires that were eliminated due to the outliers. After eliminating 6 questionnaires that were incomplete and another 10 questionnaires due to the outliers, a total of 350 samples for analysis. All the data fell within the range of normality assumptions and not exhibit any nonlinear patterns.

Measurement Model The measurement of the proposed research model, including the variables of environmental factor network structure, environmental factor service platform capabilities, environmental factor role of users, environmental factor social influence, participation behaviour in co-creation activity, citizenship behaviour in co-creation activity, attitudinal loyalty, and behavioural loyalty.

Data were analyzed for convergence through Cronbach's coefficient alpha (α) scores and all the values exceeded the threshold of 0.7 signifying significant convergence. The result shows Cronbach's coefficient values ranging between 0.874 and 0.921 which specify

significant reliability. CR values exceeding 0.7 and AVE values were greater than 0.5 areas viewed as satisfactory for internal consistency (Hair et al., 2014; Fornell & Lacker, 1981).

The absolute fit indices of the RMSEA (0.027) and GFI (0.978) indicate a good fit. The incremental fit indices of CFI (0.901), TLI (0.923), and AGFI (0.968) also indicate a good fit and meet the recommended values. Structural Equation Modelling In order to examine the hypothesized relationships pertaining to environmental factors affecting value co-creation behavior and brand loyalty in the Indonesian innovation ecosystems, a path analysis approach in structural equation modelling (SEM) was done (Hair et al., 2014).

Testing the structural research model was used to test the thirteen causal paths reflecting Hypothesis 1 to Hypothesis 13. Figure 2 presents the result of testing the structural research model. Fig. 2. Structural model Figure 2 demonstrates that all of the goodness-of-fit indexes was deemed satisfactory (χ^2/df : 2.128, RMSEA: 0.065, GFI: 0.899, CFI: 0.945, NFI: 0.937, PGFI: 0.688). Thus, the result of testing the structural research model was acceptable.

Based on this model, the relationships between the constructs as listed in the hypotheses statements are shown in Table 2. Figure 2 and Table 1 show the results. Out of the 13 hypotheses, 11 were supported except for 2 (H3 and H11). The standardized estimate coefficient (β) of all paths tested in the structural model was significant.

However, Hypothesis 3 and 11 were not supported as the standardized estimate (β) was not as expected, negative and not significant. (Hair et al., 2010). In addition, the structural model also reveals that the explanatory power (R^2) of determinant variables on endogenous variables was relatively high, customer's participation behaviour = 77.1%, customer's citizenship behaviour = 75.1%, attitudinal loyalty = 69.7%, and behavioural loyalty = 67.5%. Table 2.

Results of path coefficients and hypothesis testing Hypothesis _Relationship _Std. Estimate _Critical Ratio _Supported _ _H1 _Environmental factor network structure --> Participation behaviour _0.354 _4.121*** _Yes _ _H2 _Environmental factor service platform capabilities --> participation behaviour _0.400 _5.734*** _Yes _ _H3 _Environmental factor role of users --> Participation behaviour _-0.086 _1.051 (ns) _No _ _H4 _Environmental factor social influence --> Participation behaviour _0.110 _2.043** _Yes _ _H5 _Environmental factor network structure --> Citizenship behaviour _0.147 _2.166** _Yes _ _H6 _Environmental factor service platform capabilities --> Citizenship behaviour _0.176 _2.113** _Yes _ _H7 _Environmental factor role of users --> Citizenship behaviour _0.136 _1.831** _Yes _ _H8 _Environmental factor social influence --> Citizenship behaviour _0.452 _5.036*** _Yes _ _H9 _Customer's participation behaviour

--> Attitudinal loyalty _0.408 _3.648*** _Yes _ _H10 _Customer's citizenship behaviour
 --> Attitudinal loyalty _0.588 _16.887*** _Yes _ _H11 _Customer's participation behaviour
 --> Behavioural loyalty _-0.051 _0.591 (ns) _No _ _H12 _Customer's citizenship behaviour
 --> Behavioural loyalty _0.162 _4.335*** _Yes _ _H13 _Attitudinal loyalty --> Behavioural
 loyalty _0.080 _1.299* _Yes _ _Note: ***p < 0.01, **p < 0.05, *p < 0.1, ns = not supported _
 _DISCUSSIONS This section will analyze the research results and discusses the
 contribution this research makes to academic theory and managerial practice. As we can
 see in the final research model, not all latent constructs are consistent with the literature.

Rather, environmental factor role of users and customer's participation behaviour were found to have no direct relationship with behavioural loyalty. Instead, they all influenced attitudinal loyalty through another construct in a direct way. The results of this study indicate that the environmental factor network structure, environmental factor platform capabilities and environmental factor social influence is a direct path and is a factor that significantly influences participation behaviour in co-creation activity.

These findings support H1, H2, and H4, which means the findings are consistent with previous research studies (Lusch & Nambisan, 2015; Kane et al., 2014; Edvardsson et al., 2011; Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al., 2014; Anagnostopoulos et al., 2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014).

The structure of a network is the way Indonesian buyers with mobile payment are connected to each other within the network. Indonesian buyers with mobile payment create the structure with others based on shared competences, information resources, and relationships. The type of connectivity (interactions, relations, proximities, flows) and ties characteristics (strength, affect, degree, symmetry) that form the structure, affect network formation, with implications for the platform's design and consequently influence the behaviour and dynamics of network.

Moreover, the result of data analysis shows that environmental factor network, environmental factor platform capabilities, environmental factor role of users, and environmental factor social influence is a direct path and is a factor that significantly influences citizenship behavior in co-creation activity. These findings support H5, H6, H7, and H8, which means the findings are consistent with previous research studies (Lusch & Nambisan, 2015; Kane et al.,

2014; Edvardsson et al., 2011; Barros et al., 2000; Lusch & Nambisan, 2015; Kane et al., 2014; Edvardsson et al., 2011; Vargo & Lusch 2008; Hoyer et al., 2010; Romero & Molina, 2011; Anagnostopoulos et al., 2008; Ajzen & Fishbein, 1980; Li, 2011; Tsai & Bagozzi, 2014). In co-creation users deliver the service and co-create the value.

The role of user refers to “socially defined expectations of individuals’ behaviours, in particular, social positions”. According to S-D logic, all economic and social users adopt the role of resource integrators rather than the individual user. Value is co-created during interactions between providers and beneficiaries through the integration of resources and the application of competencies.

On the other hand, customer’s participation behaviour in co-creation activity and customer’s citizenship behavior in co-creation activity influence is a direct path and is a factor that significantly influences attitudinal loyalty. Customer’s citizenship behavior in co-creation activity and attitudinal loyalty influence is a direct path and is a factor that significantly influences behavioural loyalty. Thus, the hypotheses H9, H10, H12, and H13 were supported, which means the findings are consistent with previous research studies (Franke et al.,

2009; Mathwick et al., 2007; East et al., 2005; Hennig-Thurau et al., 2004; Caruana, 2002; Zeithaml et al., 1996; Mariyudi & Matriadi, 2017). According to the recent marketing strategy literature, value co-creation strategy as active engagement of target customers in the process of value creation to reinforces customers’ loyalty.

Our results have provided any empirical support that the Indonesian buyer's participation in co-creation activity positively influences customers’ loyalty toward mobile payment brands. Therefore, we conclude that co-creation activity in Indonesian buyers with mobile payment automatically influences customers’ loyalty. This study contributes to the literature on the four stages of the Oliver’s Model in Indonesia Innovation Ecosystems.

The research confirms that customer loyalty consists of both attitudinal and behavioral aspects. Customer loyalty evolves in stages and it is a multidimensional approach, the study supports attitude-behavior relationship theory (Fishbein & Ajzen, 1975).

CONCLUSION The study highlighted that the environmental factor network structure, environmental factor platform capabilities and environmental factor social influence is a direct path and is a factor that significantly influences participation behaviour in co-creation activity.

Moreover, the result of data analysis shows that environmental factor network, environmental factor platform capabilities, environmental factor role of users, and environmental factor social influence is a direct path and is a factor that significantly influences citizenship behavior in co-creation activity. Finally, the customer’s participation behaviour in co-creation activity and customer’s citizenship behavior in

co-creation activity influence is a direct path and is a factor that significantly influences attitudinal loyalty.

Customer's citizenship behavior in co-creation activity and attitudinal loyalty influence is a direct path and is a factor that significantly influences behavioural loyalty. Involving customers to co-create value and user engagement in co-creation activities is an important new marketing strategy for any company. Managers abandoned the traditional product-centric value by engaging customers, in order to produce products that will fulfill customers' needs, effectiveness, increase productivity, and will lead to brand loyalty. The complex multi-dimensional concept of brand loyalty plays an important role in the longterm stability of any company.

Hence, in order to ensure a continuous stream of revenue, mobile payment companies should understand, how to achieve that customers develop a favorable attitude toward their brand, which they will purchase consistently in the future. . LIMITATIONS AND FUTURE RESEARCH This research represents an important step in understanding Customer Value Co-creation Behaviour the buyers with mobile payment in Indonesia Innovation Ecosystems. There are a few limitations to the study.

Firstly, and perhaps the most important, this conceptual research-based focused mainly on the durable goods industry which is not entirely in line with the service sector. The results may have been more encouraging, further research is necessary to base on previous studies carried out in the mobile payment ecosystems. Secondly, this study fails to fully explain the antecedents of the Indonesian buyer's participation in co-creation activity in the mobile payment ecosystems in full extent, since not all possible contributing factors were examined.

Other factors related to customer or to company may also have a significant effect of customers' participation in co-creation activity such as openness, uniqueness of problem, clarity of task, trust and rapport, commitment to common goals, customers' expertise, etc. (Auh et al., 2007; Hakanen & Jaakkola, 2012). However, these factors were beyond the scope of our study.

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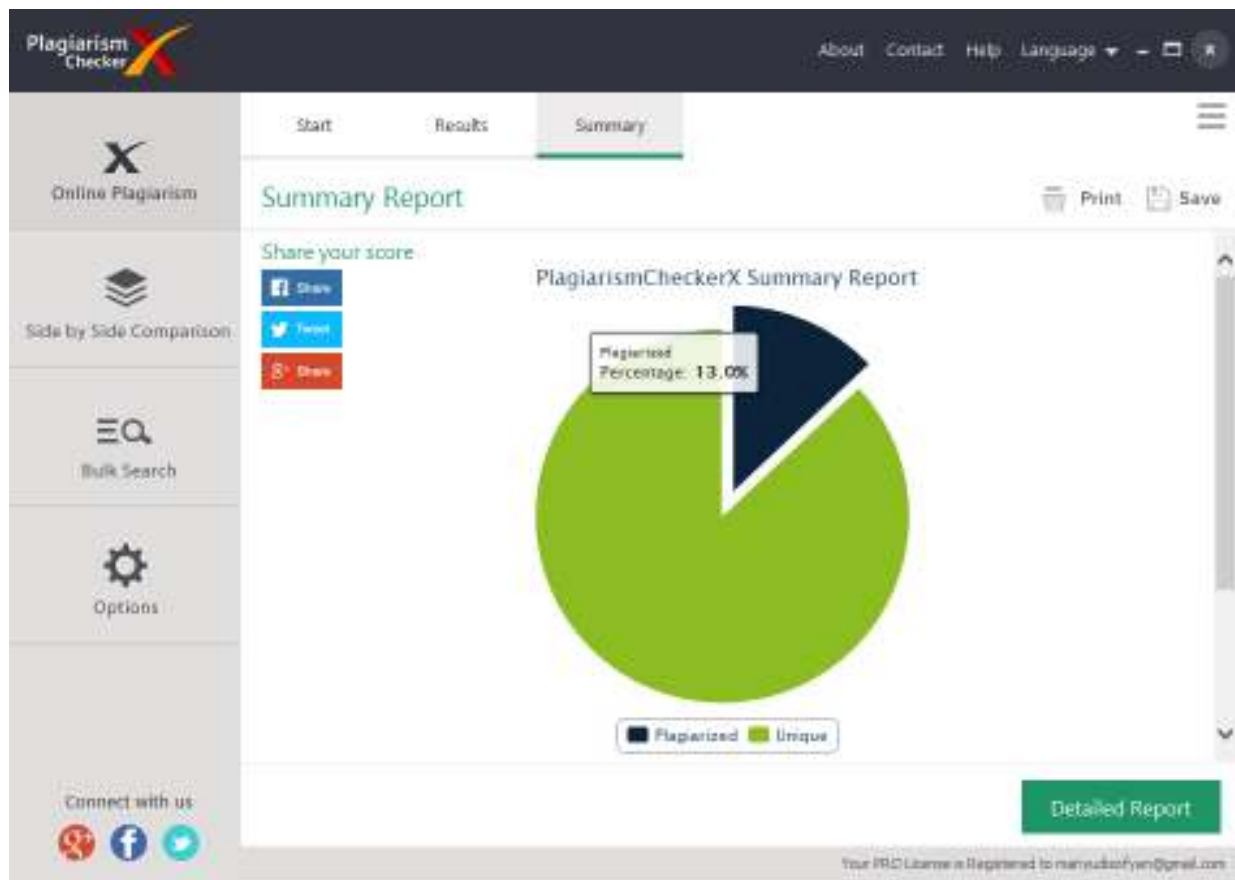
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