Designing Game Online Physical Voucher using House of Quality (HOQ) and Kano Model

Rosika Kusharfinna, Muhammad Akbar[1], Dradjad Irianto[2] †
Department of Industrial Engineering
Bandung Institute of Technology, Bandung, Indonesia
Tel: (+62) 22-250-6449, Email: akbar@ti.itb.ac.id[1], dradjad@mail.ti.itb.ac.id[2]

Abstract. A telecommunication enterprise in Indonesia has been penetrating to game online market since 2013 by selling game voucher to the gamers. The enterprise sells e-voucher in SMS form, whereas 80% gamers prefer to choose physical voucher that is more simple. To expand the markets, the enterprise is going to develop new product which is physical voucher by distributing it to several game online outlets using electronic data capture (EDC). This research proposes a developing method of physical voucher design to compete with other competitors. The methodology consists of several step i.e. identifying market potential using chain-ratio method, identifying customer requirement attribute using questionnaire, and creating design alternative of physical voucher using house of quality (HOQ) and Kano model principle. The result showed that the monthly potential market was about IDR 395 millions from 8 outlets. Furthermore, there were 13 customer attributes which is derived from 3 construct variable i.e. product, price, and seller location. Those attributes then were derived into 17 technique characteristics used in designing phase. The voucher was designed in official notes that consist several information such as transaction time, voucher code, and website address with the maximum price of IDR 2000 more than its nominal listed.

Keywords: game online, voucher, product design, HOQ, Kano model

1. INTRODUCTION

Game online could be defined as a PC game which uses internet or LAN network, so it can be accessed by many users (Nurmalasari, 2010). This game has entered Indonesian's market since 2001. From preliminary study, it can be inferred that the number of gamer grow rapidly 5 – 10% each year that has reached 25 millions gamers in 2013.

Many game publishers today apply voucher payment system as a money replacement to access or maintain the game. In the first launching, game publishers applied pay-to-play (P2P) environment which the voucher could be used as a payment for playing the game in several time package or as a digicash for buying special items inside the game. In spite of tough competition among publishers, pay-to-play environment has been changed to be free-to-play (F2P) that the voucher is used as digicash only. With this environment, game online industry got US$ 150 millions revenue in 2013.

A telecommunication company in Indonesia has started to join game online business by distributing the voucher from game publishers to the gamers since 2013. This company started this business with indirect distribution strategy by using website as a selling portal. There were approximately 200,000 transactions to buy electronic vouchers (e-vouchers) each month using this portal. This company has a plan to expand its market by applying direct distribution strategy using physical voucher. It was because 80% of gamers prefer buying physical vouchers to buying e-vouchers.

The company knew that physical voucher was sold previously by game online outlets in unofficial paper. So, the company decided to create the official voucher to penetrate the market. Because of that, this research is proposed to create an optimal design of physical voucher. This design started from the market research to identify what the gamers preference was.

Some previous researches used online game as their research object. Uysal (2016) used structural equation modeling (SEM) analyses to show that investment model provides a valid framework for examining game commitment. Another research examined online service recovery influenced by the relative effects of four dimensions of justice (distributive, procedural, interpersonal, and informational) on consumer attitudinal reactions (satisfaction and trust) and their subsequent effects on behavioral intentions (e-WOM and repurchase intention) in online games (Ding and Lii, 2016). Result revealed that all four dimensions influenced satisfaction and trust. Based on those researches, investment in designing voucher system procedure could influence gamer satisfaction to predict greater game commitment.

2. LITERATURE REVIEW

2.1 Total Market Potential

Kotler and Keller (2012) said that market potential could be estimated using chain-ratio method by multiplying population market to several adjustment factors that can contribute to buying power. Best (2013) defined a formula to compute market potential by multiplying several factors which are maximum number of buying units, buying ceiling, purchase rate per year, purchase quantity per purchase, and average price as in equation (1).

$$MP = B * C * R * Q * P \quad (1)$$

Where:
MP = market potential
B = maximum number of buying units
C = buying ceiling
R = purchase rate per year
Q = purchase quantity per purchase
P = average selling price

2.2 Consumer Behavior Model

Kotler and Keller (2012) described that buying decision depend on marketing stimuli which are used as tools reach the target market by expanding its demand. Marketing stimuli can be categorized in four parts which are product, price, place, and promotion as in figure (1).

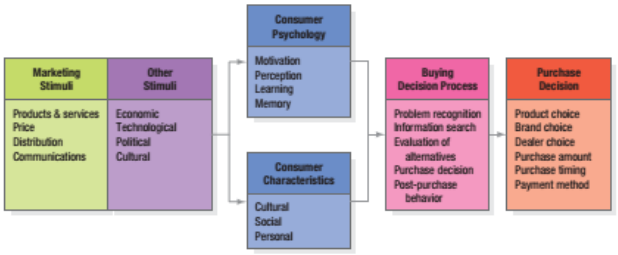

Figure 1: Model of Consumer Behavior
(Kotler and Keller, 2012)

2.3. Kano Model

Kano model was developed by Professor Noriaki Kano from Tokyo Rika University. This model could classify several customer preferences level that contribute to customer satisfaction. This model consists of 3 steps implementation which are identifying of customer preferences, ranking product characteristics by its preferences, and locating each characteristic to Kano classification (Kano et. al, 1984).

Chaudha, et. al (2011) explained that there are 6 type of needs that can influence customer satisfaction (Figure 2) which are must-be, one dimensional, attractive, indifferent, reverse, and questionable. Must-be category is known as need that will make customer unsatisfied if its value is lower than the standard. One dimensional category has a linier relationship with the customer satisfactory. The higher value of this need the higher value of satisfaction. Then, attractive category is an additional need that will not make customer unsatisfied if it does not exist. Indifferent category is a neutral need that has no relationship with customer satisfaction. Reverse category will make customer satisfied if it does not exist. Finally, questionable category is unknown whether the customer will be satisfied or not if this need exists.

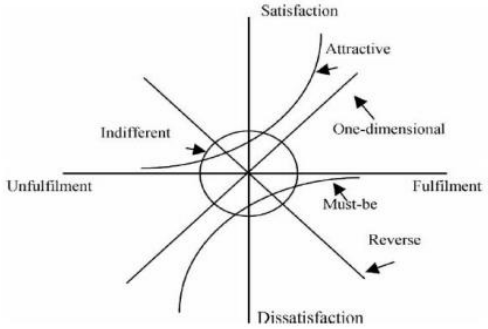

Figure 2: Kano Model Needs Category
(Chaudha, et. al, 2011)

2.4. Quality Function Deployment

Quality function deployment (QFD) could be defined as a methodology to translate customer needs into a design of product that fulfil its technical requirements and quality characteristics (Akao, 1990). Cohen (1995) said that there are 4 phases in QFD process which are designing product, developing product, designing process, and planning production.

QFD in first phase or designing product is usually called as house of quality (HOQ). HOQ could be integrated with Kano Model to create a product design as in Figure 3 (Hashim & Zawiah, 2001). This approach was used in this proposed research to create physical voucher design.

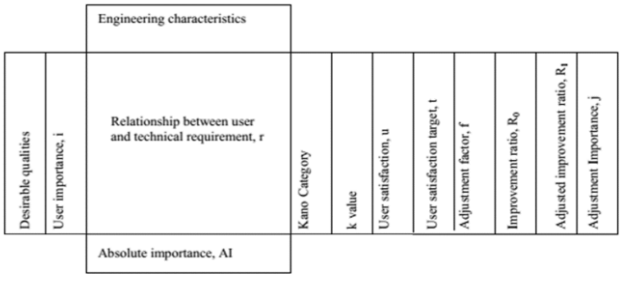

Figure 3: Integrated Based HOQ 3 (Hashim & Zawiah, 2001)

3. RESEARCH METHODOLOGY

This research was conducted at several in implementation steps as follow:

3.1. Identifying Customer Needs

This data was collected by interviewing 20 – 30 gamers that could encompass 80 – 90% of customer needs (Griffin and Hauser, 2004). Sampling was conducted using judgmental approach by selecting gamers who have bought voucher more than 5 times. Interview question list was developed based on Ulrich and Eppinger (2004) direction that consists of 6 questions which are: (1) when the voucher was used? (2) for what it was used? (3) where does the gamer usually buy? (4) what does gamer think about the voucher? (5) what kind of factor consider by gamer to choose? (6) what kind of improvement needed?

Interview result was interpreted to be customer need and was structured in hierarchical form. Customer needs was arranged based on construct variable of 4 market stimuli as in figure 1. Product construct was interpreted using Garvin 8 dimension of quality. Price construct was interpreted by product price. Then, place construct was interpreted using 5 dimension of Servqual. But, promotion construct was not derived to dimension because it was irrelevant.

Voucher developer team as an expert decided to eliminate 5 irrelevant dimensions from 14 dimensions which has been defined by researcher. Three irrelevant dimensions were from quality dimensions which were durability, conformance to standard, and perceived quality. And, two irrelevant dimensions from servqual dimension which were reliability and empathy. The rest relevant dimension (see Table 1) then used as a guidance for making questionnaire.

Table 1: Relevant Dimension of Market Stimuli

Construct	Dimension	Definition
Product	Performance	Feasibility and easiness to change voucher to be digicash
	Feature	User manual and new feature to exchange voucher with money inside game
	Reliability	Originality of voucher
	Serviceability	Guarantee mechanism if the voucher unusable
	Aesthetic	Form, size, color, and picture in the voucher
Price	Product price	Product price for gamer
Place	Tangibles	Product itself, transaction system, and availability
	Responsiveness	Transaction speed
	Assurance	Transaction security

3.2. Developing and Distributing Questionnaire

Questionnaire was divided in 3 parts which were 1) respondent identity to know about gender, age, finance, and kind of game played; 2) customer preference to know about user importance level of each customer attribute using Likert scale; and 3) Kano model to translate attribute to positive and negative statements. So, the improvement direction could be known for each attribute.

Questionnaire was distributed based on judgmental sampling. Respondent was filtered for only gamers who have bought voucher in the last one year in several outlets that have daily revenue of at least IDR (Indonesia's Rupiah) 300,000. Indonesia's Rupiah (IDR) would be used as currency in the rest chapters on this paper.

3.3. Computing Market Potential

Market segmentation and data correlation had been considered before the market potential was computed. Chain-ratio method used in this research to compute market potential by multiplying population number to several adjustment factors that had been collected from respondent demography data.

3.4. Developing design of physical voucher

Integrated based house of quality (HOQ) was used to create voucher design in several steps as in Figure 4.

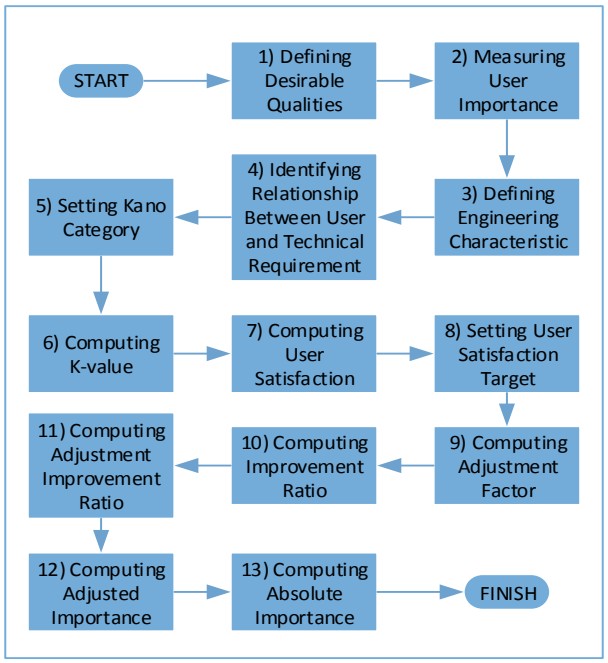

Figure 4: Integrated HOQ Step by Step

4. IMPLEMENTATION

4.1. Identifying Customer Needs

There were 23 gamer respondents has been interviewed to identify customer needs. They were 88% men and 12% women. The respondents had age between 16 – 25 years old. Their occupation were students or employees.

Interview result was interpreted in 46 customer needs. These needs then were organized to 13 customer attributes based on relevant dimension of market stimuli as in Table 2.

Table 2: Customer Attributes

Relevant Dimension	Customer Attribute
Performance	Voucher code can be read clearly
	Digit number of code
	Voucher validity period
Feature	Voucher user manual
	New feature: voucher could be exchanged with game money
Reliability	Originality seal of voucher
Serviceability	Voucher could be replaced to another voucher if it is unusable
Aesthetic	Voucher has a picture content of character, monster, landscape view, or game symbol
Product price	Product price
Tangibles	Voucher could be buy in several nominals.
	Buying mechanism (direct or indirect)
Responsiveness	Service speed
Assurance	Transaction security (zero deception risk)

4.2. Developing and Distributing Questionnaire

First part of questionnaire about the respondent identity consisted of 10 question items with 8 of them were closed questions. Four items were designed based on some previous researches which were gender (Lin and Lin, 2011), age (Siswanto and Hendriana, 2011), monthly income/pocket money (Ferry, 2007), and playing location (Chandra, 2006). Six other items were new such as game type played in last one year, confirmation as voucher buyer in last one year, buying frequency in a month, total spending for online voucher each month, voucher price nominal bought in last one year, and transaction location.

Second part of questionnaire about customer preference consisted of 13 question items based on customer attribute as in Table 2. Each item rated using 4 level Likert scales which were unimportant (lowest), poor important, quite important, and important (highest). This even number of scale was designed to eliminate its center value. This condition could increase respondent commitment to distinguish only important or unimportant (Brace, 2004).

Last part of questionnaire was about Kano model. Six attributes had been known of their improvement direction such as must-be or one dimensional (Cohen, 1995) which were: 1) voucher code can be read clearly - *must be*; 2) voucher could be exchange to another voucher if it is unusable – *must be*; 3) voucher could be buy in several nominals – *must be*; 4) buying mechanism – *one dimensional: the easier the better*; 5) service speed – *one dimensional: the faster the better*; and 6) transaction security – *must be*. So, these 6 attributes were unasked in the questionnaire. The other 7 attributes were derived into 14 statements, 7 positive statements and 7 negative statements, as in Table 3. Each statement rated using 5 level value based on Kano model which were dislike (*I don't like it that way)*, can be (*I can live with it*), neutral (*I am neutral*), must be (*It must be that way*), and like (*I like it that way*).

Before used, this questionnaire had been test by 31 respondents. There were 3 kind of test which were analysis of item, reliability, and validity. Item was analyzed using point biserial correlation which the result shown that all of the attribute variable could be used with corrected item-total correlation value higher than 0.25. Then, reliability was analyzed using internal consistency with alpha Cronbach value which the result shown that both of construct (product and place) had high reliability with value of 0.804 and 0.831. Finally, validity was analyzed using construct validity with Pearson correlation value which the result shown that all of attributes were valid with Pearson correlation greater than 0.301.

Table 3: Kano's Customer Attributes

No	Customer Attribute	Statement
1	Digit number of code	Less than 20 digits
		More than 20 digits
2	Voucher validity period	Voucher has validity period
		Voucher has not validity period
3	Voucher user manual	Voucher has user manual
		Voucher has no user manual
4	New feature: voucher could be exchanged with game money	voucher could be exchanged with inside game money
		voucher could not be exchanged with inside game money
5	Originality seal of voucher	Voucher has seal
		Voucher has not seal
6	Voucher has a picture content	Voucher has picture content
		Voucher has not picture content
7	Product price	There is rule of maximum price of IDR 2,000 higher than its nominal
		There is no rule of maximum price

In distribution phase, researcher defined sample number by considering two previous researches. Klein (2011) said that minimum sample number is 10 – 20 times the number of construct which means this research need 60 sample from 3 constructs. Another research from Roscoe in Sekaran (2007) said that sample number has an interval between 30 – 500 respondents. This questionnaire has been distributed to 89 respondents that was higher than the minimum value of 60. After collected, the data had also been test by using analysis of item, reliability, and validity. The result shown that the data had passed all of test with corrected item-total correlation value for each attribute higher than 0.25, Product and Place's Alpha Cronbach value were 0.714 and 0.660, and Pearson correlation for each attribute higher than 0.3.

Finally, the data had also been analyzed using correlation test. The result shown that there were relationships between buying location with playing location and between buying location and voucher nominal. Playing location had positive correlation with game outlets as buying location and had negative correlation with website as buying location. Then, game outlet as buying location had negative correlation with IDR 250,000 nominal value. And, website as buying location had negative correlation with IDR 20,000 and had positive correlation with IDR 250,000 nominal value.

4.3. Computing Market Potential

Market segmentation was analyzed using cluster analysis to define several type of gamers. The result shown that there were 3 type of gamers with detail characteristics as follow in Table 4.

Table 4: Market Segmentation

Characteristics	Cluster #1	Cluster #2	Cluster #3
Size	27%	44.9%	28.1%
Voucher spending budget (IDR)	100,001– 200,000	50,001– 100,000	0 – 50,000
Voucher nominal bought in last 1 year (IDR)	100,000	50,000/ 65,000	20,000- 25,000
Monthly income/pocket money (IDR)	500,001 – 1,000,000	200,000– 500,000	≤ 200,000
Buying Location	outlets	Website	outlets
Playing Location	outlets	outlets and home	outlets

Market potential was computed using formula as in equation (1). Number of population had been gotten by interviewing to operator from 8 game outlets chosen in Bandung as in Table 5. The total population was 18,933 gamers per month.

Table 5: Game Outlets Population Number

Outlets #							
1	2	3	4	5	6	7	8
1044	2522	2528	3408	3132	2840	2627	833

There were 3 assumptions used to compute market potential value which are: 1) respondent behavior represents population behavior, 2) each gamer comes to outlet once every month, 3) all of gamers buy maximum 8 vouchers per month. Equation (1) used to compute market potential for each nominal value for each monthly buying frequency. Recapitulation of this computation can be seen in Table 6.

Table 6: Market Potential Computation in IDR

No	Voucher Nominal (IDR)	Market Potential (IDR)
1	10,000	49,769,742
2	20,000	77,581,781
3	30,000	29,006,856
4	35,000	29,460,183
5	50,000	63,518,976
6	65,000	66,448,118
7	100,000	75,696,784
8	250,000	4,212,509
Total Market Potential		**395,694,948**

4.4. Developing Design of Physical Voucher

Desirable qualities were represented by customer attributes. Each attribute's user importance then was computed using average value from questionnaire data collected as in Table 7.

Engineering characteristics were defined by company's developer team. There were 17 characteristics as in Table 8.

Table 9 -10 shown the recapitulation of integrated HOQ process to generate the design. Relationship between user importance and engineering characteristic measured using 5 scale value from weak relationship (1 point) to strong relationship (5 point). Kano categories which are must-be (dissatifiers/basic/expected), one dimensional (satisfiers/ straight-line), attractive (delighters/exciting), and indifferent have coefficient value called k-value. Chauda et. al (2011) proposed 0 score for indifferent (I), 0.5 for must-be (M), 1 for one-dimensional (O), and 1.5 for attractive (A). User satisfaction used same score with the user importance.

Table 7: User Importance Measurement

No	Customer Attribute	User Importance
1	Voucher code can be read clearly	3.63
2	Digit number of code	3.1
3	Voucher validity period	3.42
4	Voucher user manual	3.24
5	New feature: voucher could be exchanged with inside game money	3.13
6	Originality seal of voucher	3.57
7	Voucher could be replaced to another voucher if it is unusable	3.76
8	Voucher has a picture content of character, monster, landscape view, or game symbol	2.67
9	Product price	3.57
10	Voucher could be buy in several nominals.	3.58
11	Buying mechanism (direct or indirect)	3.51
12	Service speed	3.66
13	Transaction security (zero deception risk)	3.89

Table 8: Engineering Characteristics

No	Engineering Characteristic
1	Font type
2	Font size
3	Font space
4	Code combination between alphabet and number
5	Unique code combination
6	Voucher user manual shown on website
7	Voucher user manual shown in buying location
8	Agreement statement with developer
9	Gamer see printing process directly
10	Replacement system by customer relationship
11	Serial number shown
12	Voucher printed on paper that has waterprint of game symbol
13	Price recommendation information
14	Credit voucher transaction system
15	Outlet transaction system
16	Internet connection on EDC printing machine
17	Periodic evaluation to outlets

Table 9: Integrated House of Quality Result Part-1

Customer Attribute Number	*User Importance*	Engineering Characteristic Number																	%S	%D
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**		
1	3,63	3	5	3															-	-
2	3,10				5														0,26	-0,57
3	3,42					5													0,49	-0,40
4	3,24	1	3	1			3	3											0,20	-0,65
5	3,13								1										0,36	-0,24
6	3,57									3									0,30	-0,45
7	3,76										5	5							-	-
8	2,67												3						0,30	-0,32
9	3,57													5					0,21	-0,59
10	3,58														5				-	-
11	3,51														3	3			-	-
12	3,66																5		-	-
13	3,89															3		5	-	-
Absolute Importance ($j*r_1$)	**j*r**	14,85	29,90	14,85	6,26	5,00	11,56	11,56	1,00	3,00	15,00	15,00	6,00	12,61	29,00	21,00	20,00	20,00		
	Rank	8	1	8	13	15	11	11	17	16	6	6	14	10	2	3	5	4		

Table 10: Integrated House of Quality Result Part-2

Customer Attribute Number	*Kano Category*	*K value*	*User Satisfaction*	*User Satisfaction Target*	*Adjustment Factor*	*Improvement ratio*	*Adjusted Improvement Ratio*	*Adjusted Importance*	
								i*R1	Rank
1	Must-be	0,5	3,63	3,67	0,00	1,01	1,01	3,67	5
2	Must-be	0,5	3,10	1	0,57	0,32	0,40	1,25	10
3	Indifferent	0	3,42	1	0,49	0,29	0,29	1,00	11
4	Must-be	0,5	3,24	3	0,65	0,93	1,19	3,85	4
5	Indifferent	0	3,13	1	0,36	0,32	0,32	1,00	11
6	Indifferent	0	3,57	1	0,45	0,28	0,28	1,00	13
7	Must-be	0,5	3,76	3	0,00	0,80	0,80	3,00	6
8	Indifferent	0	2,67	2	0,32	0,75	0,75	2,00	9
9	Must-be	0,5	3,57	2	0,59	0,56	0,71	2,52	8
10	Must-be	0,5	3,58	4	0,00	1,12	1,12	4,00	1
11	One Dimensional	1	3,51	3	0,00	0,86	0,86	3,00	6
12	One Dimensional	1	3,66	4	0,00	1,09	1,09	4,00	1
13	Must-be	0,5	3,89	4	0,00	1,03	1,03	4,00	1

Based on HOQ result, physical voucher was designed using bottom-up approach from gamers who used voucher for the last one year. Design was created using three constructs from marketing stimuli which were product, price, and place.

As in figure 5, voucher product was designed using waterprint paper by implementing model Q inventory system. Its designed size was 5 cm x 9 cm that printed using EDC machine. Its designed font was Capital Arial for alphabet and Consolas for number using 12 pt. size. Voucher replacement follow company's terms and conditions. Then, designed information inside the voucher was 1) voucher name symbol, 2) time and buying location, 3) voucher nominal, 4) 25 digits voucher code, 5) serial number that automatically linked to voucher code, and 6) website address to access user manual.

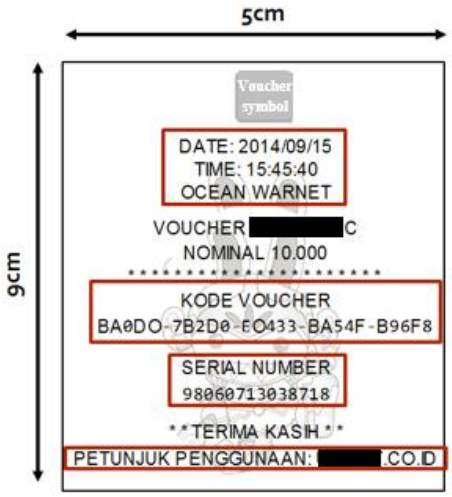

Figure 5: Physical Voucher Design

The company recommended that the voucher maximum price should be IDR 2000 more than its nominal listed. Voucher was designed to be sold directly in game outlets in Bandung city for trial. The company would give EDC machine and magnetic card for free to the outlets. Then, each outlet would be evaluated any given time to maintain its quality.

5. CONCLUSION

This research has created a design for online game's physical voucher in Indonesia, especially in Bandung. Designing process was started by customer need identification. There were 13 customer attributes which is derived from 3 construct variable i.e. product, price, and seller location. Those attributes then were derived into 17 technique characteristics used in designing phase. Market could be segmented in 3 clusters with monthly potential market was about IDR 395,000,000 from 8 outlets. The voucher was designed in official notes that consist several information such as 1) voucher name symbol, 2) time and buying location, 3) voucher nominal, 4) 25 digits voucher code, 5) serial number that automatically linked to voucher code, and 6) website address to access user manual. with the maximum price of IDR 2000 more than its nominal listed. For first trial, voucher would be sold directly in game outlets in Bandung city for trial.

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