

A Study on Zero Pay Image Recognition Using Big Data Analysis

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Abstract

The 2018 Seoul Zero Pay is a policy actively promoted by the government as an economic stimulus package for small business owners and the self-employed who are experiencing economic depression due to COVID-19. However, the controversy over the effectiveness of Zero Pay continues even after two years have passed since the implementation of the policy. Zero Pay is a joint QR code mobile payment service introduced by the government, Seoul city, financial companies, and private simple payment providers to reduce the burden of card merchant fees for small business owners and self-employed people who are experiencing economic difficulties due to the economic downturn. , it was attempted in the direction of economic revitalization for the return of alleyways[1].Therefore, this study intends to draw implications for improvement measures so that the ongoing zero-pay can be further activated and the economy can be settled normally. The analysis results of this study are as follows. First, it shows the effect of increasing the income of small business owners by inducing consumption in alleyways through the economic revitalization policy of Zero Pay. Second, the issuance and distribution of Zero Pay helps to revitalize the local economy and contribute to the establishment of a virtuous cycle system. Third, stable operation is being realized by the introduction of blockchain technology to the Zero Pay platform. In terms of academic significance, the direction of Zero Pay's policies and systems was able to identify changes in the use of Zero Pay through big data analysis. The implementation of the zero-pay policy is in its infancy, and there are limitations in factors for examining the consumer image perception of zero-pay as there are insufficient prior studies. Therefore, continuous follow-up research on Zero Pay should be conducted.

Key words : Zero Pay, Consumer Image, Big Data, Semantic Network, CONCOR Analysis

1. INTRODUCTION

Zero Pay is a policy that the Seoul Metropolitan Government is actively pursuing with the purpose of economic policy to relieve the economic burden of small business owners and self-employed people by reducing card fees. Zero Pay is a new simple payment method based on QR codes to reduce card merchant fees for self-employed and small business owners, promoted by the strong will of the Seoul Metropolitan

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Government. The existing card payment fee rate was promoted by the government and Seoul's economic revitalization policy, which judged the economic burden on the self-employed and small business franchisees. Zero Pay was named to mean no commission with 0% payment fee for merchants with annual sales of 800million won or less[2]. Promotion of Zero Pay, which is being issued under the leadership of Seoul's economic policy In addition to the reason that it is difficult to proceed with a separate payment for Zero Pay, the situation is that consumers who pay at the store do not request Zero Pay first unless they strongly demand Zero Pay. As a result, the media continue to criticize the attack, saying that the zero-pay policy is not effective. However, the new payment service system of Zero Pay is difficult to establish in the state where other existing credit and debit card payment service systems are well established. In spite of this controversial situation, Zero Pay's continued efforts to secure more than 100,000 affiliated stores in 2020 through the government and Seoul's efforts to secure franchises have resulted in success, and its recognition continues to rise through broadcasting advertisements and public relations. However, the current number of existing franchisees and customers is still insufficient for Zero Pay to be established stably, so the need for gradual improvement continues to emerge for the activation of Zero Pay. Therefore, this study examines whether the first purpose of Zero Pay is to expand consumer demand through consumer image recognition, which is the target of the effectiveness of the zero-pay economy revitalization policy using big data, and secondly, the task of economic recovery of small business owners and self-employed people. The purpose of this study is to examine how the role of zero-pay change in

2. THEORETICAL BACKGROUND

2.1 Zero pay

Zero Pay is a simple account transfer payment system service created by the government, local governments, financial institutions, private businesses, etc. in cooperation with private and private sectors to reduce the burden of franchise fees on small business owners[3]. If small business owners and self-employed people use the zero-pay payment system, it has been implemented as an economic revitalization policy that helps merchants' income without any burden on franchise fees, and consumers can also use it with other credit card payment apps. Zero Pay merchant fees are charged 0% of commission for small business owners with sales of less than 800 million won per year, 0.3% for 800 million won to 1.2 billion won, and 0.5% for more than 1.2 billion won, and the payment system is immediately paid to payment merchants[4]. Although Zero Pay and Seoul regional love gift certificates continued to be criticized and criticized for their low competitiveness in the early days of implementation, they were selected as the No. 1 "Seoul's Top 10 Corona News" in 2020 by playing a vital role in national economic disasters due to consumers. As of May 2021, there were 913,079 franchises nationwide, which were only 10,000 in the initial implementation of Zero Pay, and the payment amount was 20,796 billion won in May 2021[5]. However, small business owners and self-employed people are a payment system in which Zero Pay has a lot of economic benefits, but from the perspective of consumers, Zero Pay needs to improve its benefits compared to fewer franchises and other credit cards[6]. So far, there have been many negative opinions and articles from the media about Zero Pay, but for Zero Pay to be successful, the government, small business owners, self-employed people, and consumers hope to put a lot of effort and sincerity into it. Currently, there are studies on the simple payment system in previous studies of Zero Pay, but there are no prior studies on Zero Pay image recognition. Accordingly, Seoul Zero Pay referred to previous studies of local currency in consistency with local currency. There are various definitions of local currency in form and use, but general local currency is used by local governments by issuing money on their own, and through this, it is defined as an economic activity method in which local residents exchange goods and services [7]. Since previous studies of local currency aim to boost the local

economy and revitalize the economy through the distribution structure and effect of local currency through government tax injection, Seoul Zero Pay aims to restore the economic cycle, small business owners, and alley businesses in Seoul.

Table 1. Affiliate (place) , Cumulative payment amount

(Source: Korea Simplified Payment Promotion Agency)

division	Affiliate (place)	Cumulative payment amount (KRW 100 million)
December 2018	15,505	0.3
June 2019	251,990	140
December 2019	324,002	768
June 2020	569,395	4,969
December 2020	729,313	11,529
May 2021	913,079	20,796

2.2 Big data

Big data was classified into five dimensions: data quantity, diversity, speed, variability, and complexity [4]. The characteristics of ‘big data’ include volume, velocity, variety, and value, and are classified into structured, semi-structured, and unstructured data, and are processed using a database and software. It refers to a large amount of data that is difficult to access [8]. The use of big data analysis is suitable for various analyzes such as rapidly changing consumer perception and market trend trends, and refers to the technology to understand social phenomena and predict the future through analysis of personal emotions, behaviors, choices, etc. [9]. Social big data refers to a series of analysis processes in which meaningful implications are derived through the collection and analysis of large amounts of data through social digital media such as blogs, news, Twitter, and Facebook. Big data creates new values by deriving consumers' perceptions, emotions, and latent variables, and presents a new vision to various institutions and academia through Park Data [10].

2.2.1 Text mining

Text mining is the concept of text-based knowledge discovery, and it is a technology that extracts unknown knowledge, information, and useful patterns using natural language processing technology through a text-based database by Feldman and Dagan. It is a technology that extracts valuable information by analyzing it as a context rather than a simple word made up of unstructured data such as posts, news, and SNS on the Internet social media. In this study, key words for ‘Zero Pay’ and words that can be identified as key words were extracted and analyzed by analyzing the frequency of extracted texts and identifying the linkages between texts from social media related to ‘Zero Pay’.

2.2.2 Semantic network analysis

Semantic network analysis is a method of semantic analysis within a network based on analysis through analysis of relationships between words by extracting words from text in social network theory. It is the stage of analyzing the network formed from the extracted word, and since it is used for meaning interpretation, even the hidden meaning in the text can be analyzed [11]. In addition, it is possible to visualize patterns and meanings by extracting structured data from unstructured data [12]. Through the

centrality of the network, the intention of delivering the entire text can be identified [13]. Therefore, in this study, a semantic network analysis was performed using UCINET 6.0 to visualize the word in the relationship of simultaneous appearance with the analysis of the word 'Zero Pay' on social media to understand the overall consumer image of 'Zero Pay'.

2.2.3 CONCOR analysis

CONCOR analysis is a method for identifying clusters of similar words among words with convergent correlations. It is a research method that identifies clusters of words by analyzing co-occurrence matrix correlations between words and identifies relationships between clusters [9]. In this study, UCINET 6.0 was used to figure out how the text keywords related to 'Zero Pay' form a cluster, and NETDRAW was used to visualize the network between words.

3. Research Methods and Research Tools

In this study, for the purpose of analyzing consumer image recognition for Zero Pay in Seoul using big data, domestic portal and online site data were collected, and the collected data was refined and network analysis was performed. For research analysis data, data including keywords were collected using data provided through TEXTOM. The objects of collection include all Naver blogs, cafes, news, web documents, knowledge IN, and academic information, and web documents such as the following blogs, cafes, news, Google, Twitter, and YouTube. The search term collection period is from January 1, 2020 to December 31, 2021, which is the time of the outbreak of the pandemic Corona-19, by extracting the main words of the text related to 'Zero Pay' through the setting of a two-year period to connect the words Text mining, semantic network analysis, and CONCOR analysis techniques were used to identify the image of consumers and consumers.

Table 2. Analysis data information

division	Contents
Collection range	Naver blog, news, cafe, knowledge IN / D blog, cafe, news, knowledge IN / Google News / Twitter / YouTube
collection period	January 1, 2020 ~ December 31, 2021 (2 years)
collection tool	TEXTOM
search word	Zero pay
analysis keyword	60 EA
analysis tool	TAXTOM, UCINET 6.0 NETDRAW
amount of data collected	3.53MB

3.1.1 Data purification and analysis procedures

In this study, the purification procedure of the collected data was carried out. First, words with unclear meanings were deleted from the collected data. For example, one syllable is ‘year’, ‘up’, ‘thing’, ‘month’, ‘Personnel’, ‘hoe’, etc. This is because the deleted word could not be understood or contained an ambiguous meaning of the word. After refining, the collected data was analyzed by text mining and semantic network analysis. Text mining analysis is a type or relationship research method, and by uploading a text file collected and purified from TEXTOM, frequency, TF-IDF, connection centrality, etc. are analyzed, and the degree of importance of a word can be grasped with a numerical confirmation value of specific word frequency. Connection centrality is a statistical number that measures each node and the state in which nodes are connected in the network by the connection of words. The high connection centrality of a node means that the word is often used together with other words. It is playing a central role in the text. In this study, semantic network analysis was performed with text mining analysis results using TEXTOM. Semantic network analysis is a text semantic analysis method that extracts words from text data and identifies the simultaneous appearance and connection relationships between words. For semantic network analysis, 60 EA words in 2020 and in 2021 were converted into 1-mode matrix in TEXTOM. Transformed data were tested for statistical significance on the network using UCINET 6.0 In addition, CONCOR analysis was performed to derive meaningful information about the network created using NETDRAW. CONCOR analysis is a cluster analysis to identify the relationship between subgroups of the network. Groups formed of nodes with high similarity through analysis have a common theme. In this study, the semantic structure and context latent in the zero-pay related texts were used to check the CONCOR analysis.

3.1.2 word frequency analysis

Table. 3. Frequency of key words in

Word	Frequency number	Word	Frequency number
1 zero pay	16184	31 Onnuri gift certificate	430
2 use	4950	32 Income deduction	345
3 payment	4823	33 publish	333
4 franchisee	3447	34 card	332
5 gift card	2047	35 convenience store	330
6 service	1791	36 traditional market	321
7 online	1613	37 point	309
8 Sale	1399	38 cash	288
9 mobile	1277	29 sailing	261
10 Benefits	1221	40 home page	253
11 small business	1212	41 mobile gift certificate	246
12 easy payment	1130	42 delivery	243

13	purchase	1031	43	Target	226
14	Seoul City	867	44	National subsidy	222
15	Korea Simple Payment Promotion Agency	810	45	uses	216
16	introduction	807	46	platform	199
17	application	784	47	installation	195
18	payback	755	48	digital	194
19	app	717	49	blog	192
20	consumer	635	50	Ttareungyi	177
21	system	577	51	cashback	173
22	region	576	52	grant	172
23	Seoul Love Gift Certificate	560	53	Smartphone	169
24	debit	533	54	Academy	168
25	registration	526	55	receipt	159
26	Disaster subsidy	524	56	shopping mall	151
27	Beeple Zero Pay	520	57	limit	150
28	activation	468	58	app	150
29	government	460	59	Local love gift certificate	150
30	Commission	457	60	Kakao Pay	147

Table 3. shows the frequency of big data analysis words from January 1, 2020 to December 31, 2021 for Zero Pay. From January 2020 to December 2021, 60 word frequencies were extracted. As a result of the frequency of words used in big data, 2020 shows relatively high levels of 'merchant', 'use', 'purchase', 'payment', and 'benefit' regarding the introduction and use of Zero Pay, and the government Words related to 'National Support', 'Disaster Support', 'Hope Meal Voucher' and 'Corona' are appearing. The consumer image of Zero Pay reflects the difficult economic recession, along with 'small business', traditional market, 'gift certificate' and 'mobile', which are the basic aims of revitalizing the local economy, and the words 'Seoul', 'Corona', 'disaster support' also has a high frequency. It can be seen that the words of images such as 'application', 'use', 'merchants', 'fee', and 'simple payment' appear high for consumers to use Zero Pay.

3.1.3 Word cloud visualization



Figure 1. Visualizing Word cloud.

Figure 1. In a word cloud visualization, the larger the letter, the more often the word appears. 'Zero Pay', 'Use', 'Payment', 'Members', 'Gift Certificate', 'Mobile', etc. Accessibility words for use of Zero Pay, 'disaster support', 'small business', 'national support' 'application' 'Seoul City' A lot of words for support due to Corona have appeared. In addition, related words such as zero-pay system, app, easy payment, service, and 'Seoul Love Gift Certificate', 'Mobile', 'Gift Certificate', 'Simple Payment', 'Kakao Pay', 'Onnuri Gift Certificate', 'Local Love' Competitive simple payment counterparts such as 'gift certificate' appeared. Consumers showed a lot of interest in the benefits of government subsidies from COVID-19 in 2020 and 2021 and the social impact of the economic downturn.

3.1.4 CONCOR analysis

In this study, for semantic network analysis, a keyword matrix was generated based on the 60 words presented in above and visualized as shown in Figure 2, using the NETDRAW function of UCINET 6.0

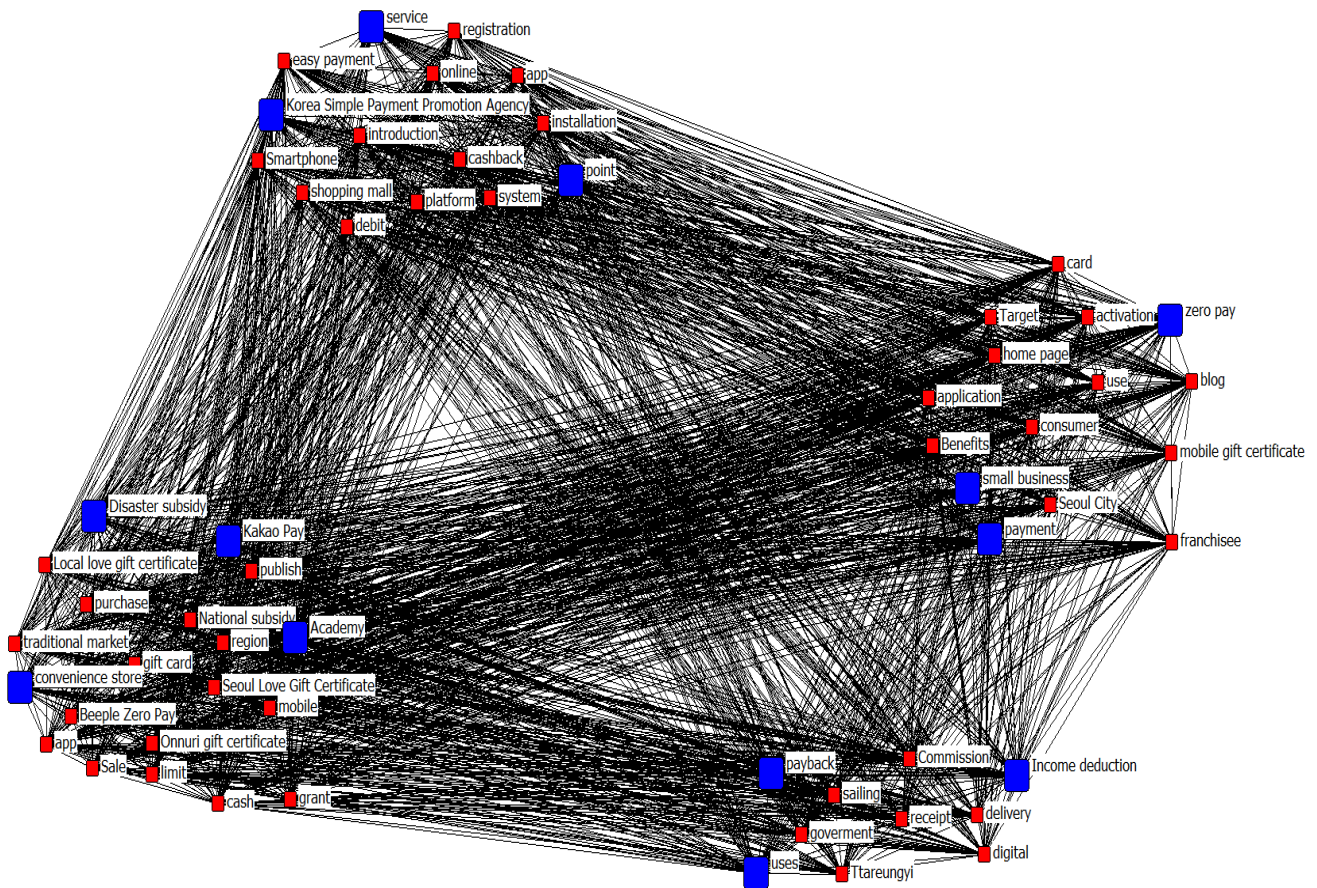


Figure 3. Result of CONCOR analysis

Table 4. Occurrence word cluster classification table

a cluster	Extraction words	Classification
a cluster 1	Zero Pay, Blog, Use, Small Business, Seoul City, Consumer, Application, Benefits, Target	Seoul Zero Pay Policy Awareness Word
a cluster 2	Service, point, simple payment, registration, app, online, system, Korea Payments Agency, smartphone, platform	Zero Pay Issuance and Usage Information
a cluster 3	Disaster support fund, national support fund, Onnuri Gift Certificate , Kakao Pay, traditional market, gift card, academy, convenience store	COVID-19 government subsidies, where they are used, and competitors
a cluster 4	Income deduction, launch, commission, receipt, delivery, utilization	Treatment plan after use of zero-pay public funds

Network analysis and CONCOR analysis were performed to understand the characteristics of a cluster of elements that form the properties of zero pay. The results of the visualization of the analysis results are shown in Figure 2, Figure 3. CONCOR analysis is an analysis that includes structural equivalence, and uses correlation coefficients to find clusters that are structurally at the same location in the linkage of clusters and classify similarities. It is a method of classifying meaningful subgroups in a network with a clear relationship

between clusters. As a result of the analysis, 4 clusters were formed, and the meaningful words among the extracted words are shown in Table 2. In the first cluster, the words 'Zero Pay', 'Blog', 'Use', 'Consumer', 'Small Business', 'Seoul City', 'Application', 'Benefit', 'Destination', etc. of Seoul's Zero Pay policy recognition words appeared, Cluster 2 is 'service', 'point', 'simple payment', 'registration', 'app', 'online', 'system', 'Korea Payment Agency', 'smartphone', 'platform', etc. It can be seen that the words of pay issuance and usage information are formed in clusters. The third cluster is a cluster of 'disaster support funds', 'national support funds', 'Onnuri Gift Certificate', 'Kakao Pay', 'traditional markets', 'gift cards', 'academies', 'convenience stores', etc. The words of government subsidies, places of use, and competing companies were formed and appeared. Cluster 4 was 'income deduction', 'startup', 'fee', 'receipt', 'delivery', 'utilization', etc.

3.2 Zero Pay's Problem

(1) Customer incentives are lacking.

The only benefit of using Zero Pay is 40% income deduction. The city of Seoul is advertising that additional income deduction is possible if you use Zero Pay, but many issues are emerging here. For the 40% income deduction, the government must revise the relevant laws.

(2) The payment process is complicated compared to cash or other cards.

While simple payment by cash or other credit card is implemented immediately, Zero Pay takes more than a minute to complete the payment. This consumes time and effort such as the consumer's bank login, payment amount, QR code generation and shooting, and the payment process is too long until the merchant's card payment confirmation. It is difficult for both consumers and franchisees to reduce the time of the payment process during the time when the payment of franchisees is concentrated.

(3) Characteristics of the domestic payment environment of Zero Pay.

The domestic card payment system ranks first in the world in terms of small amount payment by credit card due to the spread of payment devices and quick and simple payment. It also has the highest share of the number of annual card use payments per population and the amount used per transaction (KFTC, 2014, statistical analysis of domestic payment and settlement). Credit card merchants cannot refuse consumers' credit card payment, and implement a strong payment system that cannot impose credit card fees on consumers, so there is no social inconvenience to merchants or consumers about changing payment methods. In Korea, the payment system is well-maintained, and changes to the payment system are not desired.

3.3 Zero Pay Improvement Plan

(1) It is necessary to introduce a simple remittance system that does not use an official certificate and a financial portal service app that can use various types of financial services as a benefit of opening and charging a zero-pay account.

(2) With the introduction of the Zero Pay membership system, it is now possible to pay with the bank app or simple payment app that the consumer has for the convenience of consumers. However, the usage of payment apps is decentralized. Banks and simple payment service providers are providing many benefits as they use payment services. Currently, Zero Pay does not provide benefits for the number of times or amount used, so many benefits must be provided to consumers through the membership system.

(3) Zero-Pay Mode of Banking App Many experts say that the usability of the banking app is worse when comparing the bank app with zero-pay and the simple payment app. It is making efforts to continuously improve other simple payment apps and to minimize the use of essential security programs. Banking apps that use Zero Pay also have to put in a lot of effort.

(4) Although the Zero Pay homepage informs you of the location of the Zero Pay affiliates, it is difficult to check and consume by accessing the homepage every time. In addition, you must check the Zero Pay sticker at the store door or at the checkout counter to check whether Zero Pay can be used. In order to prevent this situation, innovation in the verification method of Zero Pay affiliate stores is necessary.

4. CONCLUSION

This study was conducted to present image recognition data of consumers who are affected by COVID-19 through the relationship of words used in relation to Zero Pay. Key search terms and issues related to Zero Pay posted online Using TEXTOM to analyze consumer image recognition for two years from January 1, 2020 to December 31, 2021, portal sites Naver, DAUM, Google, Twitter Words were extracted through collection, refinement, and analysis of structured and unstructured texts written on YouTube, , and unnecessary words and words that appeared in common were excluded. The process of extracting 60 key words using word frequency ranking was carried out, and key words were selected through text mining and analyzed in the form of a matrix. Using UCINET 6, a social network analysis program, visualization analysis of text network centrality and structural co-ordination (CONCOR) was conducted. As a result of the analysis of words searched for two years from 2020 to 2021, it was found that words belonging to the top of the frequency ranking, such as zero pay, use, payment, card, application, and disaster support, play an important role related to zero pay, and small business owners In addition to the purpose of recognizing the economic revitalization policy for Seoul's zero-pay, such as , consumers, applications, and benefits, the benefits and uses of zero-pay support such as disaster support, national support, Seoul love gift certificate, income deduction, traditional markets, convenience stores, discounts, etc. Related words also appeared. Information delivery on what purpose Zero Pay was launched and what benefits are provided, and the words of benefits such as application, issuance, registration, introduction, benefit, service, affiliated store, and points were also extracted with high frequency. Questions and answers related to the delivery of information about Zero Pay issued by Seoul on portals and SNS and the process of how to use it by consumers are mainstream. As a conclusion of this study, the following analysis was derived.

First, it shows the effect of increasing the income of small business owners by inducing consumption in alleyways through the economic revitalization policy of Zero Pay. Second, the issuance and distribution of Zero Pay helps to revitalize the local economy and contribute to the establishment of a virtuous cycle system. Third, stable operation is being realized by the introduction of blockchain technology to the Zero Pay platform. In terms of academic significance, the direction of Zero Pay's policies and systems was able to identify changes in the use of Zero Pay through big data analysis. with the activation of Zero Pay, Seoul is actively advertising and promoting through the media. However, due to COVID-19, various policy benefits such as national support funds and disaster support funds are being paid and utilized as zero pay. The resolution of various problems such as small business owners and self-employed fees, easy payment, and connection of zero delivery apps is still insufficient. For the Seoul Metropolitan Government to continuously establish a stable position as an economic revitalization policy for Zero Pay, the city and the local small business owners, self-employed, and consumers must work tirelessly and cooperate with each other. There is a need to increase the accessibility of So far, it is evaluated that the economic impact of Seoul and the establishment of the system have been successfully implemented due to the increase in the amount of Zero Pay usage and issuance, but if consumers do not use it continuously, problems may arise in the positive economic effect. For continuous regional economic revitalization and zero-pay, the Seoul Metropolitan Government should continue to collect opinions from small business owners and consumers, and the direction of system improvement should be reflected in economic revitalization policies. This study may have limitations in collecting and analyzing the text area written in Korean based on Naver, DAUM, Google,

YouTube, and Twitter channels. There is a lack of problems, and it is expected that better research results on zero-pay can be derived and analyzed in future research by overcoming the limitations by analyzing texts through collection through various channels.

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