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Enhancing Small-Business Ecosystems Through Local Currency Designs in South Korea: A Choice Experiment Approach

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Abstract: Local governments have introduced local currency systems to stimulate regional economies by encouraging local spending and preventing financial outflows. Since the success of a local currency depends on residents' active participation, understanding consumer preferences is essential for designing effective systems. This study used a choice experiment and stated preference data to identify the features that most influence local currency adoption. Using the conditional logit model, the analysis revealed that purchase limits, merchant coverage, number of service businesses, local infrastructure, and incentives significantly impact users' willingness to participate. The scenario analysis further highlighted the necessity of regional differentiation in currency platforms. By adopting an urban analytics approach, these results offer evidence-based insights for policymakers aiming to establish robust, spatially differentiated local currency platforms that bolster regional economic vitality across diverse urban contexts.

Keywords: consumer spending behavior; local currency system; local commerce ecosystem; regional economic revitalization; small-business financing; spatial economic analysis; sustainable economic growth; urban economic planning

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1. Introduction

Local currency systems have been proposed as a means to strengthen local economies and mitigate economic leakage. By restricting transactions to specific geographical areas, these currencies reduce the outflow of local spending to other regions or online markets. This mechanism can help protect local small businesses and microenterprises while also generating jobs and enhancing financial self-reliance [1,2]. Since local currencies typically rely on shorter distribution paths, they can lower logistics costs and carbon emissions, thereby providing environmental benefits. However, such currencies do not replace legal tender [3]; rather, they function as a complementary economic system in which residents use locally issued and circulated money to exchange goods and services.

The historical origins of local currency can be traced to Robert Owen's labor vouchers in the 1820s. Owen established the first labor exchange in Britain and issued labor vouchers

as a means of payment based on the time required for production [4]. The modern concept of local currency is represented by the local exchange trading system (LETS), first implemented in 1983 in Comox Valley, British Columbia, Canada. The LETS emerged in response to severe unemployment caused by the collapse of local industries and aimed to support local communities [5]. This system, which adopts virtual currencies usable within communities to directly exchange goods and services, has been introduced and disseminated as a solution to economic crises and wartime conditions. Local currencies are also referred to as community or complementary currencies. According to Seyfang and Longhurst [6], while approximately 100 local currencies existed in the 1990s, by 2013, 3418 local currencies had been implemented across 23 countries on six continents. Thus, the local currency concept has evolved over time and has been applied in various forms.

Despite this growth, the widespread adoption and sustained use of local currencies often face challenges such as achieving sufficient scale, ensuring broad merchant acceptance, and maintaining user engagement compared to conventional payment systems. UK examples like the Brixton Pound illustrate both the potential and the difficulties of establishing thriving local currency ecosystems outside government-led initiatives [6].

Reflecting further evolution, in recent years, local currency systems have incorporated digital elements such as mobile applications, QR payment methods, and blockchain technology in their management and operation. These advancements extend beyond traditional paper voucher or card formats by introducing multilayered forms of local currency. A local currency in the form of an application can enhance consumer convenience and enables real-time usage tracking, improving the accuracy of policy impact evaluations. When mobile-based payment methods are easy to use, local residents are more likely to participate, allowing local governments to collect and analyze transaction data for the development of targeted policies.

In 2020, the use of local currencies expanded rapidly as part of government disaster relief measures for areas affected by COVID-19. Relatedly, Stewart [7] and Liu et al. [8] noted the need to address public policy and marketing challenges arising from the pandemic. Previous studies have examined the impact of COVID-19 policies on consumer spending patterns [9] and analyzed changes in consumption and expenditure due to COVID-19 restrictions [10–12]. However, in Korea, the primary policy response to the COVID-19 recession was the implementation of a local currency initiative. Korea's local currency system differs from global models. It was first introduced by the Hanbat LETS in Daejeon in 1999, shortly after the International Monetary Fund (IMF) crisis of 1997, and has remained in operation since then [13]. In 2017, local currencies began to be more widely implemented across the country. Unlike international local currency movements, which typically rely on voluntary participation, Korea's local currency system is uniquely structured as a government-led public welfare policy. Policies supporting local governments in Korea are expected to increase local spending among small-business owners and traditional markets, thereby boosting local economies and reducing income outflow.

To sustain local currency operations, local governments must maintain consistent financial and administrative support while also ensuring that appropriate features and discount rates (incentives) are tailored to the size of their respective economies. This is because local governments play an important role in fostering economic growth and well-being within their regions [14]. Moreover, in designing a local currency system, it is essential to assess both the demand for the currency and its actual use by local residents.

Previous studies on local currency systems have primarily included case studies [5,14–16], and some have evaluated local currencies' economic effects and potential benefits [4,17–21]. However, few studies have undertaken quantitative analyses that consider demand-related aspects such as consumer preferences and local currency character-

istics. Consumers are the primary decision-makers in determining the adoption of local currencies based on their individual budget constraints. These demand aspects play an integral role in establishing an efficient local currency ecosystem. Local residents are more likely to participate if the system is well-structured, and once a certain level of adoption is achieved, a sustainable local currency ecosystem can be developed. Consequently, it is necessary to quantitatively analyze consumer preferences to encourage widespread resident participation in local currency initiatives.

Accordingly, this study investigated the efficient design of local currency systems by considering consumer preferences and regional characteristics, which have been largely overlooked in previous research. In addition to these factors, this study also explores the potential effects and implications of digital technology to assess local currencies' sustainability and future growth prospects.

1.1. Current Status of Korean Local Currencies

Korea recently implemented a policy for issuing local currencies in various forms across different regions while providing subsidies to revitalize local economies and promote "regional circulation economies". Since 2019, local currencies based on relatively small cooperative economies have gained popularity across Korea, including in cities such as Daejeon and Seoul. According to the Ministry of the Interior and Safety [22], the use of local currencies has increased significantly alongside emergency government aid intended to support areas affected by the COVID-19 pandemic.

The most basic form of local currency is a voucher issued by a local government that can only be used by local government merchants [23]. This initiative was designed to increase the incomes of local small-business owners and self-employed individuals by stimulating regional consumption and preventing capital outflows. Since 2009, under the "Special Act on the Development of Traditional Markets and Shopping Districts", Korea has issued "Onnuri gift certificates" to protect and revitalize traditional markets, shopping districts, and commercial areas. As these gift certificates are accepted nationwide at registered franchise stores, they differ from local currencies, which are restricted to use at small businesses and traditional markets within a specific region [24].

According to the Ministry of the Interior and Safety [22], the total amount of local currency issued in Korea increased by 521%, from 0.37 trillion Korean won (KRW) (USD 267.3 million) in 2018 to KRW 2.3 trillion (USD 1.662 billion) in 2019. Thus, local governments have continued increasing the issuance of local currencies. In response to the 1997 IMF crisis and, later, the 2020 COVID-19 outbreak, the Korean government introduced multiple local currencies. Globally, local currency systems began to emerge following the 2008 global financial crisis. Given the growing interest in local currencies, it is essential to assess whether the existing system is beneficial and to evaluate its potential value upon implementation.

This study acknowledges Korea's distinct consumption infrastructure while recognizing that it provides similar incentives. The contributions of this study differ from previous research in three key aspects. First, we quantitatively analyzed local currencies, whereas most previous studies adopted a case-by-case approach. Second, Korea does not yet have a standardized local currency operating system, and its implementation has been uniform. Therefore, this study is significant in that it reflects consumer preferences by considering the characteristics of the local consumption infrastructure. Finally, the existing literature offers limited analysis of the structures and economic effects of local currencies. In this regard, our study is unique in that it examines consumer perspectives, enabling the recommendation of an effective local currency system to help revitalize regional economies.

The efficient design of local currency systems requires systematically analyzing urban and regional characteristics. This study adopts an urban analytics perspective, as conceptualized by Batty [25], which emphasizes data-driven decision-making and the critical importance of spatial context in understanding and shaping urban systems. Urban analytics, incorporating methodological approaches from geographic data science [26], utilizes quantitative methods and computational tools to analyze diverse urban data [27]. In contrast to purely qualitative case studies or aggregate economic models, this framework allows for the development of targeted, evidence-based policies tailored to specific local conditions. From this perspective, policies aimed at regional economic revitalization, such as local currency initiatives, are most effective when based on local socioeconomic characteristics and consumer behavior patterns identified through rigorous analysis. Thus, this study employs such an urban analytics approach to quantitatively analyze the relationship between consumer preferences for local currency systems and regional characteristics. These findings have important policy implications, as spatially differentiated currency platforms can maximize the impact of regional economic revitalization across diverse urban contexts.

1.2. Research Hypotheses

Based on the objectives of local currencies, we formulated the following research hypotheses regarding determinant factors influencing local currency adoption. These hypotheses were embedded within the original study design:

H1. *Higher incentive rates (discounts or rewards for using local currency) will significantly increase consumers' willingness to adopt the local currency.*

H2. *A larger purchase limit (the maximum monthly amount eligible for incentives) will positively affect adoption, allowing consumers to earn more of their spending benefits.*

H3. *Greater merchant coverage (higher proportion of local merchants accepting the currency) will favorably influence adoption by enhancing the currency's usability and network effect.*

H4. *More robust local infrastructure (e.g., enhanced transportation, higher urbanization, and population density) will facilitate local currency usage and adoption by fostering economic activity and improving access to merchants.*

H5. *Longer charging times (inconvenience in purchasing or recharging the local currency) will negatively impact the likelihood of adoption, as higher time costs diminish user experience.*

H6. *The impacts of the aforementioned attributes on adoption will exhibit regional heterogeneity; specifically, consumer preferences for local currency design features will demonstrate systematic variation across different regional contexts (e.g., small towns vs. metropolitan areas), reflecting underlying regional characteristics.*

This paper is structured as follows: Section 2 describes the choice experiment method, including the data collection and analysis procedures. Section 3 presents the estimation results and scenario analysis, while Section 4 offers concluding remarks with policy implications and discussions of limitations.

2. Methods

2.1. Research Model

This study analyzed consumer preferences for local currency systems. To predict consumer demand for local currency, we employed a conditional logit model using data from a choice experiment, which included analyzing consumers' stated preferences (SPs) and estimating the utility value associated with each attribute. Choice experiments have been widely used as an effective method for predicting the probability of consumers selecting specific products and services [28–32].

Based on data from the choice experiment, we analyzed consumer preferences for selected products. The parameter values of the estimated utility function can be used to calculate the marginal willingness to pay (MWTP) for each attribute [32–34]. This choice experiment analysis is also used to derive economic and policy implications for various products and services not yet available on the market [35–38]. The equation for obtaining consumer utility is

$$U_{nj} = V_{nj} + \epsilon_{nj} = \beta_j x_{nj} + \epsilon_{nj}, \tag{1}$$

where the utility that consumer n obtains from alternative j is U_{nj}, which is decomposed into the deterministic term V_{nj} and the error term ϵ_{nj} [39]. β_j is the coefficient of attribute x_j.

Based on the estimated results, the part-worth and relative importance of the attributes can be calculated [40]. Additionally, MWTP, a key indicator of consumer preference, can be calculated. MWTP refers to the change in price required to maintain constant utility when an attribute changes by one unit. It is obtained using Equations (2) and (3) [37,41].

$$MWTP_k = -\frac{\frac{df(x_k, price)}{dx_k}}{\frac{df(x_k, price)}{dprice}} = -\frac{\beta_k}{\beta_{price}}, \tag{2}$$

$$RI_k = Part - worth_k / \sum_i Part - worth_i, \tag{3}$$

where $Part - worth_k = \beta_k(x_{k,max} - x_{k,min})$.

We estimated the conditional logit model coefficients by using the maximum likelihood method. All data analysis was performed using the statistical software STATA 16. For replication and transparency, the key analytical steps were as follows: (1) constructing the experimental design (fractional factorial design of choice cards as described below), (2) collecting survey responses through a professional company, (3) coding the choice outcomes and attributes into a dataset, (4) estimating the conditional logit model coefficients using clogit in STATA (ensuring the inclusion of the "no-choice" option as described), and (5) calculating each attribute's relative importance and MWTP from the estimated results.

2.2. Data

We collected SP data through a choice experiment to analyze consumers' preferences for local currency attributes and regional characteristics. The core attributes considered were incentives and purchase limits, which are competitive factors compared to other payment methods. These attributes generate user interest in local currency and are regarded as significant. Additionally, we included the merchant ratio (the proportion of merchants accepting local currency) and the time required to charge local currency to assess its ease of use. Experts specifically consider the merchant ratio a key factor in promoting the adoption of local currencies[1]. Table 1 lists the attributes and their levels.

Table 1. Attributes and levels for local currency systems.

Attributes	Explanation	Levels
Incentives	Discounts applied when using local currency	2%, 4%, 6%, 10%
Purchase limit (KRW 1000 /month)	Maximum monthly amount of local currency eligible for incentive benefits	300, 500, 100
Merchant coverage	Percentage of merchants accepting local currency	30%, 60%, 90%
Number of service businesses	Number of companies in wholesale/retail/ accommodation/food/education services in the region	100–800, 800–3000, 3000–10,000, >10,000
Local infrastructure (points)	Regional infrastructure considering population density/urban ratio/traffic facilities	3, 5, 7, 9
Charging time (minutes)	Time required to charge/purchase local currency once	10, 20, 30, 40

Incentives refer to the discount rate applied when using local currency. These incentives vary slightly across regions that have implemented a local currency system in South Korea. The minimum incentive ranges from 4% to 5%, while the highest ranges from 6% to 10%. Some regions offer up to 10% incentives for limited periods, seasonal promotions, or special events.

The purchase limit represents the maximum monthly amount of local currency eligible for incentives. Although local currency can be used beyond this limit, incentives are not applied to excess amounts. The purchase limits are set at KRW 300,000 (USD 216.7), KRW 500,000 (USD 361.2), and KRW 1 million (USD 722.4), as different regions provide a range of services from KRW 300,000 (USD 216.7) to KRW 1 million (USD 722.4) per month.

The merchant ratio indicates the percentage of merchants in a given area accepting local currency. Based on data from Statistics Korea, we categorized service business levels into four groups: more than 100 and fewer than 800, more than 800 and fewer than 3000, more than 3000 and fewer than 10,000, and more than 10,000, covering a range of approximately 100 to 15,000 service businesses.

The local infrastructure represents the regional infrastructure by considering population [42], urban area ratio, and transportation facilities [43]. Based on a perfect score of 10, using data from Statistics Korea, regions were evaluated through regularization and average values. Metropolitan cities received an equivalent score of 9, while Seoul was assigned a score of 10.

Finally, the time required to charge local currency refers to the duration needed to charge or purchase it for use. This includes the time taken to complete a single charging session. Charging local currency via a mobile app typically takes about 5–10 min from launching the app to completing the charge. Additionally, purchasing or charging local currency in person at the National Agricultural Cooperative Federation (Nonghyup Bank, NH) requires additional time. We set the charging times at 10, 20, 30, and 40 min based on a pilot data analysis.

Alternative cards were created based on the attributes and levels. A full factorial combination of all levels would yield 2304 alternatives ($4 \times 3 \times 3 \times 4 \times 4 \times 4$), which is infeasible to present to each respondent. Thus, we applied a fractional factorial design to select a manageable number of alternatives that maintained orthogonality for estimation. The resulting design consisted of 24 distinct alternatives of local currency attributes. These alternatives were organized into six choice sets, each containing four alternatives labeled A, B, C, and D (Figure 1). Each respondent was shown these three choice tasks and was asked to indicate their preferred local currency option in each task.

Attributes	Alternative A	Alternative B	Alternative C	Alternative D
1. Incentives	2%	10%	2%	4%
2. Monthly purchase limit	500,000 KRW	300,000 KRW	1000,000 KRW	300,000 KRW
3. Merchant coverage	30%	60%	90%	60%
3-1. Number of service businesses	800-3,000	800-3,000	10,000 -	100-800
4. Local infrastructures (points)	7	9	9	7
5. Charging time	30 minutes	20 minutes	40 minutes	10 minutes
Choice		O		

Figure 1. Example of a choice set.

We also included a no-choice option in the experiment to capture a realistic decision-making process. Specifically, after a respondent identified their preferred alternative from a given choice set, we implemented a follow-up assessment of implementation likelihood by inquiring about the probability of actual utilization of their selected local currency alternative relative to existing payment methods. If a respondent stated an intention to use it less than 20% of the time in practice, we recorded this as no choice (to stick with their current payment methods), which was labeled as type E (no choice) in the analysis.

Prior to the primary data collection phase, a preliminary online pilot study involving 300 respondents was conducted to test and refine the survey instrument. The main survey was conducted by Gallup Korea, a professional research firm. The primary data collection was implemented online over an 11-day period (12–22 May 2020), encompassing a total of 525 participants. A stratified sampling methodology based on key demographic variables was employed to ensure the sample adequately represented the broader South Korean population. Through the implementation of these stratified quotas and random sampling within each demographic stratum, population representativeness across Korea was attained. Detailed demographic characteristics of the respondent pool are delineated in Section 1.

3. Results and Discussion

3.1. Estimation Results

Table 2 presents detailed sample statistics. Among the 525 respondents, specific questions were included for those with prior experience using local currency. A total of 189 respondents (36%) had used a local currency. Of these, 112 charged their local currency through mobile apps, while 77 visited Nonghyup Bank to purchase and recharge it. Additionally, 7.43% of respondents indicated they would spend KRW 100,000–150,000 (USD 72.2–108.4). Finally, the average monthly frequency of local currency charging was 1.63 times.

Although the alternative cards consist of types A to D, type E is included in the analysis to represent no choice. No choice is assumed when respondents select the preferred alternative card as their first priority but indicate an intention to use it of less than 20% in the second question. Respondents are classified as having chosen type E as their first priority in such cases. Based on this assumption, the percentage of no-choice respondents is 61.3%.

Table 2. Demographic and regional sample characteristics.

Category		Percentage (%)	Category		Percentage (%)
Age	Under 40	41.9	Gender	Male	51.6
	40s to 50s	44.2		Female	48.4
	Over 60	13.9	Residence	Seoul	17.5
Family average income (KRW 10,000)	Less than 99	4.4		Busan	8.0
	100–149	2.1		Daegu	5.7
	150–199	4.8		Incheon	6.9
	200–249	6.7		Gwangju	3.8
	250–299	7.6		Daejeon	4.0
	300–399	16.4		Ulsan	2.3
	400–499	20.6		Sejong	1.9
	500–699	21.1		Gyeonggi-do	16.4
	700–999	12.4		Gangwon-do	2.1
	Over 1000	4.0		Chungcheongbuk-do	4.2
Monthly average expenditure (personal, KRW 10,000)	Less than 49	19.0		Chungcheongnam-do	5.0
	50–99	21.9		Jeollabuk-do	3.8
	100–149	15.0		Jeollanam-do	4.0
	150–199	11.4		Gyeongsangbuk-do	6.3
	200–249	10.1		Gyeongsangnam-do	6.9
	250–299	5.3		Jeju Island	1.3
Total: 525 people (100%)					

Table 3 shows the estimation results based on the SP data. The Korean minimum wage as of 2023 is applied to convert the charging time variable into a price attribute. A minimum hourly wage of KRW 8590 (USD 6.2) is used to calculate the price per minute, which is then multiplied by each level. For example, the price level for 10 min is calculated as 10 (minutes) × 143.17 (KRW/minute) = KRW 1431.7 (USD 1.03).

Table 3. Results of multinomial analysis (no-choice option included).

Variable	Estimate	Std. Error	Relative Importance	MWTP (KRW)
Incentive	0.0759 ***	0.0155	13.92%	1361.58
Purchase limit	0.0028 ***	0.0003	24.18%	50.32
Merchant ratio	0.0177 ***	0.0015	22.69%	317.08
Number of service businesses	0.00004 ***	0.000006	16.73%	0.67
Local infrastructure	0.1294 ***	0.0156	16.61%	2320.80
Charging time (price)	−0.00006 **	0.00002	5.86%	-
Log-likelihood	−1951.1			

Note: ** Significant at the 5% level, *** Significant at the 1% level.

Incentives, purchase limits, merchant ratios, the number of service businesses, and local infrastructure all increase utility as their levels increase by one unit. By contrast, charging time (price) decreases utility as the level rises. This result is reasonable, as respondents are expected to perceive benefits from local currency use and derive positive utility from attributes that enhance usability while experiencing negative utility for price. Based on the relative importance of each attribute, the purchase price of the local currency holds the highest relative importance, determined by the amount of incentives available and the extent of local currency use, followed by the merchant ratio, number of service businesses, and local infrastructure.

3.2. Scenario Analysis

We analyzed scenarios to evaluate the effects of local currency on demand. Xie et al. [44] demonstrated that the national support system is more efficient than the local system. However, their analysis did not consider the system's size in detail. Thus, the scenario analysis aimed to identify the levels and characteristics of local currency attributes that could increase local currency adoption by region.

To analyze the proper supply size per region, provincial government authorities with similar characteristics are grouped together. For grouping, min–max regularization is applied for all variables (population [45], gross regional domestic product [46], financial independence [47], urban ratio [48], number of companies [49], and traffic accessibility [50], the amount of Onnuri issued [51]), and the adjusted "k-means" function of the cluster package in R is used for clustering. The results of the cluster are plotted and shown in Figure 2.

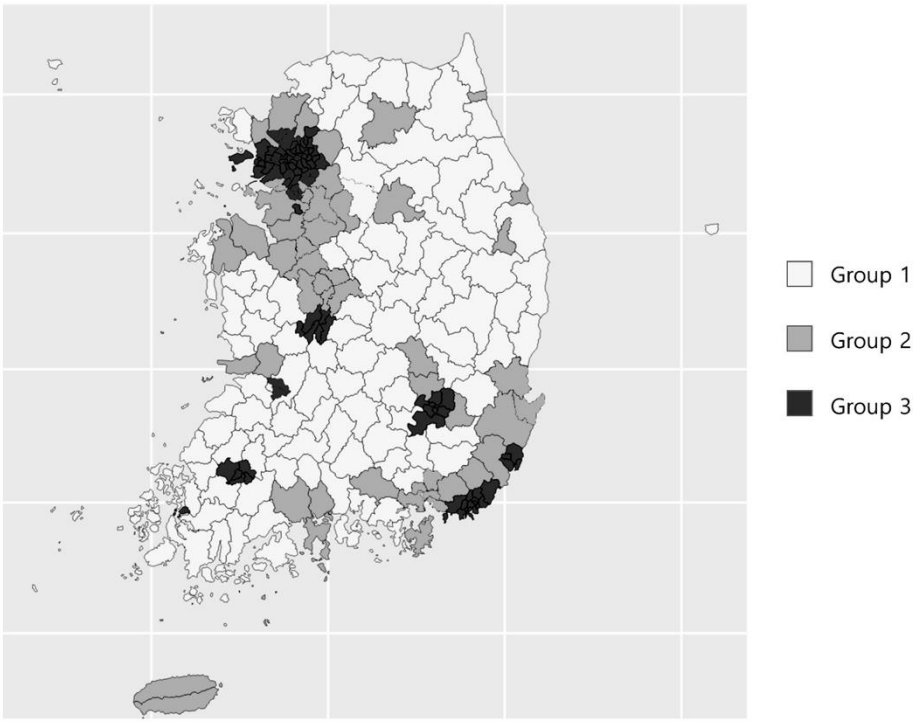


Figure 2. Clustering results for cities.

Group 1, represented by the lightest section of the map, includes most small towns. Group 2, shown in gray, consists of satellite cities near metropolitan areas. Group 3, depicted in the darkest shade, comprises districts within major metropolitan cities.

Each group exhibits distinct characteristics. Group 3 has the highest population and urban ratio, while Group 2 leads in economic indicators such as gross regional domestic product (GRDP), financial independence, and employment. Group 1 ranks the lowest across all these metrics. Additionally, the merchant ratio is fixed at the highest level, while the number of service businesses, local infrastructure, and charging time reflect the average values of the regions in each group. Moreover, incentives and purchase limits, which primarily fluctuate based on local currency policies, are adjusted to determine their impact on choice probability.

The scenarios—A, B, and C—are analyzed within Groups 1, 2, and 3, respectively (Table 4). Scenario A (Group 1) includes an average of 938 service businesses and a local infrastructure score of 1.6 based on population, urban ratio, and traffic accessibility indicators. It assumes a charging time of 30 min, converted into a price element. Scenario B

(Group 2) includes an average of 6241 service businesses, a local infrastructure score of 3.51, and a charging time of 20 min. Scenario C (Group 3) includes an average of 6817 service businesses, a local infrastructure score of 7.04, and a charging time of 10 min.

Table 4. Scenario analysis results for each group.

Variable	Scenario A		Scenario B		Scenario C	
	G1	No Choice	G2	No Choice	G3	No Choice
Incentives	4	0	2	0	5	0
Purchase limit	100	191	100	191	40	191
Merchant ratio	90	100	90	100	90	100
Number of service businesses	938	7400	6241	7400	6817	7400
Local infrastructure	1.6	10	3.51	10	7.04	10
Charging time (price)	4295.1	286.8	2863.4	286.8	1431.7	286.8
Choice probability	15.75%	84.25%	21.30%	78.70%	33.41%	66.59%

Across all scenarios, the no-choice attribute value is determined based on the analysis results. The respondents' average monthly expenditure is used as the purchase limit, while the average number of service businesses in the respondents' residential areas is used as the number of service businesses. The common outcome of the three scenarios is that providing more incentives increases the probability of choice, even when the maximum receivable benefits (incentives × purchase limits) remain constant over a month.

A comparison between Scenarios A and B reveals that local currency choice probability remains high in regions with strong utility factors (i.e., high numbers of service businesses, robust local infrastructure, and shorter charging times), even when incentives are lower within the same purchase limit. This suggests that higher incentives should be allocated to regions with relatively scarce infrastructure to promote more balanced regional adoption.

As previously mentioned, we used two variables: incentives and purchase limits. The maximum issuance amount for each group was considered to determine the most effective balance between supply and demand. We present changes in consumer choice probability based on the maximum purchase limit–incentive combination for local currency. To model this, we assumed a fixed issuance amount per region. Additionally, the "maximum purchase limit–incentive" combination affects the local currency policy budget, which is expressed in an equation to emphasize the need for a differentiated policy approach based on local budget constraints. The equation and results for determining the optimal purchase limit–incentive combination and budget allocation are as follows.

$$\begin{aligned} &Appropriate\ issuance\ of\ local\ currency\ by\ region\ (month)) \\ &= (Local\ population) \times (choice\ probability) \times (maximum\ purchase\ limit), \end{aligned} \tag{4}$$

$$\begin{aligned} Budget(month) = [(Local\ population) \times (choice\ probability)] \times \\ (maximum\ purchase\ limit) \times (incentive). \end{aligned} \tag{5}$$

Based on Equations (4) and (5), consumers' utilization decreases if the government's budget decreases due to the maximum purchase limit–incentive combination based on the proper issuance of local currency. Furthermore, in the small towns represented by Group 1 (Figure 2), incentives and choice probability decrease as the maximum purchase limit increases at the calculated level of appropriate issuance. In large cities, represented by Group 3 (Figure 3), the relationship between purchase limits, incentives, and choice probability appears to be the same as in small cities; however, as purchases increase, incentives decrease dramatically.

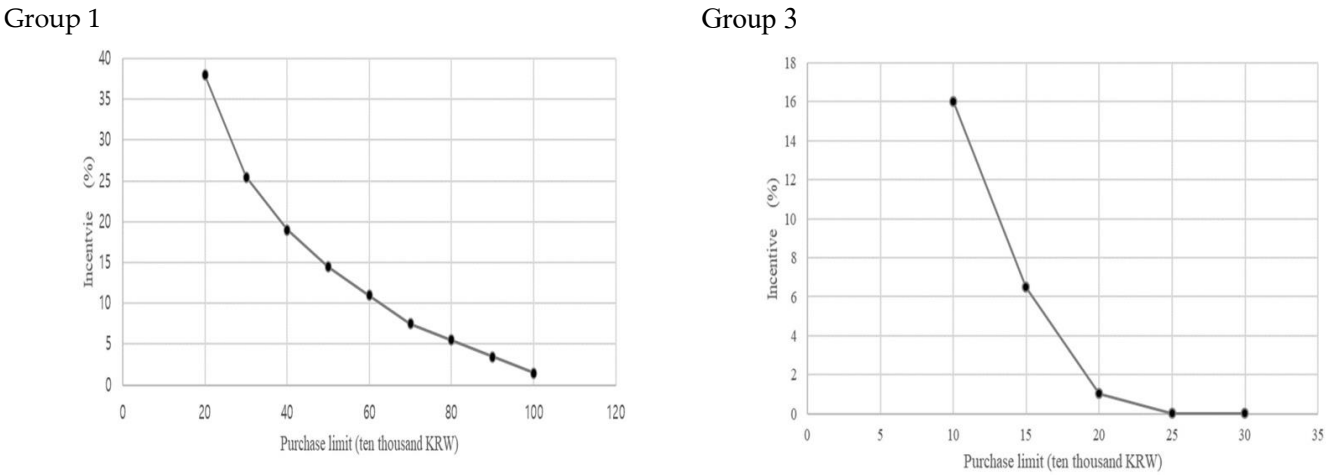


Figure 3. Relationship between purchase limit and incentive variation.

These findings provide guidelines for local governments to structure local currency policies with purchase limits and incentives that align with policy objectives while balancing consumers' utility and budget constraints.

4. Conclusions

As a supplementary currency used within a region, local currency can help prevent capital outflow and stimulate local consumption, fostering a virtuous cycle in the regional economy. To achieve this, local governments must establish currency systems encouraging resident participation in strengthening the regional economy and improving local communities. Understanding consumer preferences for local currencies is essential for designing effective policies. Accordingly, this study quantitatively analyzed consumer preferences for local currencies.

The government-led operation of local currencies in Korea continues to demand financial and administrative resources from local governments, necessitating appropriate issuance levels and discount rates based on the economic scale of each region. This study aimed to contribute to the enhancement of local currency policies by examining consumer preferences in relation to regional characteristics. The demand-side analysis, based on a survey of 525 respondents, revealed that the relative importance of currency properties, as determined by the conditional logit model, followed this order: purchase limit, ratio of merchants, number of service businesses, local infrastructure, incentives, and time (price). The study derived an MWTP of KRW 1361.58 for each 1% increase in incentives and KRW 2320.80 for each one-point increase in local infrastructure.

This study applied the core principles of urban analytics proposed by Batty [25]—"data-driven decision-making" and "consideration of spatial context"—to design local currency policies. By integrating consumer preference data with regional characteristics, we provided an evidence-based approach to developing region-specific local currency systems. Our approach demonstrates how urban analytics can enhance local currency policy effectiveness and help address economic imbalances between urban and rural areas. Applying analytical approaches to urban data offers valuable insights for policy development, ensuring that urban systems' complex and spatially differentiated nature is considered.

Moreover, based on clustering results, the scenario analysis examined the effects of varying incentives and purchase limits. First, intergroup comparisons showed that regions with high local infrastructure levels exhibited higher choice probabilities, even when incentives were lower than in regions with limited infrastructure. This suggests that higher incentives are necessary in areas with underdeveloped infrastructure to drive adoption

and ensure the effectiveness of local currency policies. Second, in-group comparisons revealed that consumers preferred higher incentives, even when the total benefit (purchase limit × incentive) remained constant. Using the issuance levels of each group, we tested several combinations of incentives and purchase limits from the demand-side perspective, demonstrating an optimal balance between consumer utility and budget constraints in relation to GRDP.

In conclusion, this study contributes to both the theoretical understanding of local currency systems and the practical application of urban analytics to regional economic policy. Considering consumer preferences and regional characteristics highlights how spatially differentiated local currency designs can enhance economic vitality across diverse urban environments. As part of the urban analytics framework, this research demonstrates that evidence-based policymaking informed by quantitative regional data analysis can lead to more effective local currency implementations. As regions seek innovative economic solutions, integrating urban analytics with local currency policy presents a promising strategy for building more resilient and sustainable regional economies.

This study has several limitations. Therefore, future research can extend this approach by incorporating additional urban system dimensions and exploring the dynamic evolution of local currency ecosystems over time. First, this study only addresses short-term preferences derived from choice experiments. However, new payment methods, such as local currency, may become established payment options with long-term adoption, potentially leading to changes in preferences in such cases. Future research can track actual usage patterns and business performance outcomes to understand these long-term effects. Second, this study did not examine the specifics of mobile applications in depth. Such analysis should encompass both technical factors, such as specific technological features, and socio-demographic dimensions, such as technology accessibility for the elderly population. Third, a more in-depth discussion of regional characteristics can be pursued. For instance, future research can perform contextualized case studies considering the distinctive sociocultural attributes characteristic of a particular geographic region.

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Abbreviations

The following abbreviations are used in this manuscript:

GRDP	Gross regional domestic product
IMF	International monetary fund
KRW	Korean won
LETS	Local exchange trading system
MWTP	Marginal willingness to pay
RI	Relative importance
SP	Stated preference
USD	United States dollar

Note

[1] There are other attributes related to local currencies, such as the region where the local currency can be used; the convenience of the app; the credit, growth, and durability of the local currency [4]; the mechanism for the local currency to support local producers and service businesses; cooperation between local businesses and financial institutions [5]; and environmental purposes [15]. We selected the attributes that best reflected the purpose of this study and the characteristics of the choice experiment.

References

1. Kichiji, N.; Nishibe, M. Network analyses of the circulation flow of community currency. *Evol. Inst. Econ. Rev.* **2008**, *4*, 267–300. [CrossRef]
2. Muralt, V. The WOERGL experiment with depreciating money. *Ann. Public Coop. Econ.* **1934**, *10*, 48–57. [CrossRef]
3. Naqvi, M.; Southgate, J. Bank notes, local currencies and Central Bank objectives. *Bank Engl. Q. Bull.* **2013**, *53*, 317–325.
4. Fare, M.; Ahmed, P.O. Complementary currency systems and their ability to support economic and social changes. *Dev. Change* **2017**, *48*, 847–872. [CrossRef]
5. Chovancova, B.; Hudcovsky, J.; Kotaskova, A. The Impact of Stocks and Bonds on Pension Fund Performance. *J. Compet.* **2019**, *11*, 22–35. [CrossRef]
6. Seyfang, G.; Longhurst, N. Growing Green money? Mapping community currencies for sustainable development. *Ecol. Econ.* **2013**, *86*, 65–77. [CrossRef]
7. Stewart, D.W. Uncertainty and risk are multidimensional: Lessons from the COVID-19 pandemic. *J. Public Policy Mark.* **2021**, *40*, 97–98. [CrossRef]
8. Liu, Y.; Pei, T.; Song, C.; Chen, J.; Chen, X.; Huang, Q.; Wang, X.; Shu, H.; Wang, X.; Guo, S.; et al. How did human dwelling and working intensity change over different stages of COVID-19 in Beijing? *In Sustain. Cities Soc.* **2021**, *74*, 103206. [CrossRef]
9. Carpena, F.; Swinkels, L. The effects of COVID-19 policies on consumer spending in Norway. *Contemp. Econ. Policy* **2024**, *41*, 56–67. [CrossRef]
10. Andersen, A.L.; Hansen, E.T.; Johannesen, N.; Sheridan, A. Consumer responses to the COVID-19 crisis: Evidence from bank account transaction data. *Scand. J. Econ.* **2022**, *124*, 905–929. [CrossRef]
11. Baker, S.R.; Farrokhnia, R.A.; Meyer, S.; Pagel, M.; Yannelis, C. How does household spending respond to an epidemic? Consumption during the 2020 COVID-19 pandemic. *Rev. Asset Pricing Stud.* **2020**, *10*, 834–862. [CrossRef]
12. Cox, N.; Ganong, P.; Noel, P.; Vavra, J.; Wong, A.; Farrell, D.; Greig, F.; Deadman, E. Initial impacts of the pandemic on consumer behavior: Evidence from linked income, spending, and savings data. *Brookings Pap. Econ. Act.* **2020**, *2020*, 35–82. [CrossRef]
13. Kang, J.; Hong, B. Community currency in Korea. *Int. J. Community Curr. Res.* **2015**, *19*, 72–80. (In Korean)
14. Perugini, F. Local government efficiency and economic growth: The Italian case. *Socio Econ. Plann. Sci.* **2024**, *91*, 101775. [CrossRef]
15. Collom, E. The motivations, engagement, satisfaction, outcomes, and demographics of time bank participants: Survey findings from a US system. *Int. J. Community Curr. Res.* **2007**, *11*, 36–83.
16. Seyfang, G. Sustainable consumption, the new economics and community currencies: Developing new institutions for environmental governance. *Reg. Stud.* **2006**, *40*, 781–791. [CrossRef]
17. Aldridge, T.J.; Patterson, A. LETS get real: Constraints on the development of local exchange trading schemes. *Area* **2002**, *34*, 370–381. [CrossRef]
18. Danson, M.W. Debates and reviews. *Reg. Stud.* **1999**, *33*, 63–72. [CrossRef]
19. Groppa, O. Complementary currency and its impact on the economy. *Int. J. Community Curr. Res.* **2013**, *17*, 45–57.
20. Kovács, S.Z.; Lakócai, C.; Gál, Z. Local alternative currencies. New opportunities in expanding local financial services. *Public Fin. Q.* **2018**, *63*, 473–489.
21. Michel, A.; Hudon, M. Community currencies and sustainable development: A systematic review. *Ecol. Econ.* **2015**, *116*, 160–171. [CrossRef]
22. Ministry of the Interior and Safety. *Comprehensive Guidelines for Projects to Support Issuance of Local Gift Certificates*; Ministry of the Interior and Safety: Sejong City, Republic of Korea, 2019. (In Korean)
23. Kim, P. Cases of local currency at domestic and foreign. *Local Gov. Rev.* **2020**, *2019*, 28–34.
24. Lee, M. *Chung Nam Report 97. It is Necessary to Revitalize Traditional Markets that are Full of Vitality and to Activate the Use of Gift Certificates*; ChungNam Institute: Daejeon, Republic of Korea, 2014; pp. 1–12. (In Korean)
25. Batty, M. Urban analytics defined. *Environ. Plann. B Urban Anal. City Sci.* **2019**, *46*, 403–405. [CrossRef]
26. Singleton, A.; Arribas-Bel, D. Geographic data science. *Geogr. Anal.* **2021**, *53*, 61–75. [CrossRef]
27. Kandt, J.; Batty, M. Smart cities, big data and urban policy: Towards urban analytics for the long run. *Cities* **2021**, *109*, 102992. [CrossRef]
28. Alpaydın, U.A.R.; Fitjar, R.D. Proximity across the distant worlds of university-industry collaborations. *Pap. Reg. Sci.* **2021**, *100*, 689–712. [CrossRef]

29. Green, P.E.; Srinivasan, V. Conjoint analysis in marketing: New developments with implications for research and practice. *J. Mark.* **1990**, *54*, 3–19. [CrossRef]
30. Ko, S.; Choi, I.J.; Kim, D.G.; Shin, J. Segmented user demand forecasting for libraries in the 15-minute city considering users' preferences and spatial patterns. *Cities* **2024**, *151*, 105159. [CrossRef]
31. Mulliner, E.; Algrnas, M. Preferences for housing attributes in Saudi Arabia: A comparison between consumers' and property practitioners' views. *Cities* **2018**, *83*, 152–164. [CrossRef]
32. Romero-Espinosa, D.; Sarrias, M.; Daziano, R. Are preferences for city attributes heterogeneous? An assessment using a discrete choice experiment. *Pap. Reg. Sci.* **2021**, *100*, 251–273. [CrossRef]
33. Breidert, C. *Estimation of Willingness-to-Pay: Theory, Measurement, Application*; Springer Science + Business Media: Berlin/Heidelberg, Germany, 2007.
34. Mackenzie, J. A comparison of contingent preference models. *Am. J. Agric. Econ.* **1993**, *75*, 593–603. [CrossRef]
35. Arning, K.; Kowalewski, S.; Ziefle, M. Health concerns versus mobile data needs: Conjoint measurement of preferences for mobile communication network scenarios. *Hum. Ecol. Risk Assess. Int. J.* **2014**, *20*, 1359–1384. [CrossRef]
36. Cai, Z.; Aguilar, F.X. Consumer stated purchasing preferences and corporate social responsibility in the wood products industry: A conjoint analysis in the US and China. *Ecol. Econ.* **2013**, *95*, 118–127. [CrossRef]
37. Jo, H.; Shin, J. Evidence-based equilibrium analysis of two-sided market in food delivery industry. *J. Retailing Con. Serv.* **2024**, *77*, 103646. [CrossRef]
38. Park, S.; Maeng, K.; Shin, J. Efficient subsidy distribution for hydrogen fuel cell vehicles based on demand segmentation. *Technol. Forecasting Soc. Change* **2023**, *186*, 122113. [CrossRef]
39. Train, K.E. *Discrete Choice Methods with Simulation*; Cambridge University Press: Cambridge, UK, 2009.
40. Green, P.E.; Srinivasan, V. Conjoint analysis in consumer research: Issues and outlook. *J. Con. Res.* **1978**, *5*, 103–123. [CrossRef]
41. Hensher, D.; Shore, N.; Train, K. Households' willingness to pay for water service attributes. *Environ. Resource Econ.* **2005**, *32*, 509–531. [CrossRef]
42. Kim, S.; Park, S. Analysis of regional inequality in economic growth. *Basic Res. Tasks Korea Res. Inst. Local Admin.* **2008**, *1*, 46–75. (In Korean)
43. Eberts, R.W. Public infrastructure and regional economic development. *Econ. Rev.* **1990**, *26*, 15–27.
44. Xie, X.; Zhang, Y.; Zhang, R.J.; Ding, Y.; Guo, Y. Better support for national than local system during the COVID-19 pandemic in China. *Anal. Soc. Issues Public Policy* **2022**, *22*, 183–197. [CrossRef]
45. Ministry of the Interior and Safety. *Resident Registration Population Statistics*. 2009–2019. Available online: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1YL20651E&conn_path=I2 (accessed on 15 April 2025).
46. Statistics Korea. *Regional Income Statistic (Gsross Regional Domestic Product)*. 2010–2018. Available online: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=INH_1C91&conn_path=I2 (accessed on 15 April 2025).
47. Ministry of the Interior and Safety. *Financial Independence Ratio*. 2009–2019. Available online: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1YL20921&conn_path=I2 (accessed on 15 April 2025).
48. Statistics Korea. *Census on Establishments*. 2009–2019. Available online: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1K52C04&conn_path=I2 (accessed on 15 April 2025).
49. Korea Land & Housing Corporation. *Urban Planning Status*. 2009–2019. Available online: https://kosis.kr/statHtml/statHtml.do?orgId=460&tblId=DT_315_2019_H0004&conn_path=I2 (accessed on 15 April 2025).
50. The Korea Transport Institute. *National Transport Survey and Database (Traffic Accessibility Index)*. 2009–2019. Available online: https://www.ktdb.go.kr/www/selectTrnsportTreeView.do?key=32 (accessed on 15 April 2025).
51. Small Enterprise and Market Service (SEMAS). *Statistics on Onnuri Gift Certificate Issuance*. 2009–2019. Available online: https://www.data.go.kr/data/15067651/fileData.do (accessed on 15 April 2025).

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