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Measures to Overcome Population Decline and Regional Extinction Crises of Pan-tourism Aspects in Korea: An Exploratory Study using ChatGPT

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A B S T R A C T

Purpose: The issue of regional extinction due to the population crisis has long been recognized in Korea. As a result of this issue, Korea is facing a serious socioeconomic crisis. This study explored new and existing policy ideas for overcoming population decline and regional extinction in Korea and explored the importance and effectiveness of these policies in pan-tourism aspects using OpenAI's ChatGPT.
Design/methodology/approach: Variables were extracted from existing research papers, reports, journals, and interviews with experts in related fields. The study then examined how ChatGPT recognizes (evaluates) the importance and effectiveness of individual policies or ideas in five fields. This study attempted to increase reliability by taking measurements eight times over one year.
Findings: The findings highlighted the prioritization of general strategies such as quality employment, education, healthcare, and housing, alongside the effectiveness of pan-tourism strategies in addressing regional depopulation. Public relations and marketing activities were also deemed crucial, followed by policy development and administrative support.
Research limitations/implications: This study is highly significant as it explored short-term and effective policies for overcoming the population decline crisis and regional extinction from a pan-tourism perspective and evaluated these policies using ChatGPT. To ensure the validity of the results, comparative research with stakeholders will be necessary.
Originality/value: This study focused on the issues of population decline and regional extinction in Korea, innovatively utilizing ChatGPT for auxiliary analysis. The research findings offer valuable insights for policymakers and professionals involved in regional development and tourism management.

Keywords: Population decline; Regional extinction; ChatGPT; Pan-tourism; Exploratory study

I. Introduction

Korea's population crisis remains serious and

regional extinction is accelerating. In fact, since the 1980s, Korea has faced three population cliff periods, and despite the government's active attempts to increase the birth rate, it fell to 0.72 in 2023, the lowest in the OECD (Statistics Korea, 2023). This has also received attention from overseas media. The New York Times pointed out the seriousness of the

Korean population crisis in its editorial "Is South Korea Disappearing?" The article likened the situation to the Black Death in Medieval Europe. Similarly, the BBC article "Why South Korean women aren't having babies," published on February 28, 2024, shed light on the low birth rate among Korean women. Factors such as the inadequate sharing of childcare responsibilities, high housing and education costs, and evolving social norms have been identified as key reasons for the declining birth rate.

The issue of regional extinction due to population crisis has long been recognized in Korea. Efforts to combat the population crisis in Korea include the establishment of the Presidential Local Administration Committee, operation of the Regional Extinction Response Fund, implementation of the Hometown Love Donation System, expansion of quotas for foreign workers, and research on resident and stayer populations. Notably, the Statistical Office's pilot calculation results for the living population in areas experiencing population decline categorized these areas into various types such as tourists, military, commuters, and foreigners. Quarterly disclosures for all 89 areas with declining populations are set to begin in 2025 (Statistics Korea, 2024). The living population comprises people who stay in other regions temporarily for tourism, cultural activities, recreation, and regular exchanges.

Meanwhile, a recent decision by a United States Federal Court drew public interest. The ruling stated that artwork created solely by artificial intelligence (AI) without human intervention was not eligible for copyright protection. Judge Howell stressed the enduring importance of human creativity in copyright law, asserting that even as the law evolves, human involvement remains essential for establishing copyright (Dong-A Ilbo, 2023). Essentially, this decision underscores the necessity of human input for copyright recognition and protection. Since its launch in November 2022, ChatGPT has captured global attention, igniting a surge in generative AI and offering innovative solutions in robotics and automation. Generative AI, which learns from existing content such as text, images, audio, and video and generates new content in response

to user queries, has seen significant advancements propelled by ChatGPT.

In addition, research utilizing ChatGPT in the tourism field is increasing. Overseas studies have covered tailored travel recommendations, trust, and behavioral intentions (Ali et al., 2023); recommendation agents (Kim et al., 2023); tourism education and learning outcomes (Dalgıç et al., 2024); research ethics (Nautiyal et al., 2023); interdisciplinary research in tourism (Shin and Kang, 2023); and marketing content (Zhang and Prebensen, 2024). These studies highlight the increasing adoption of ChatGPT across diverse industries and domains. In Korea, ChatGPT and other generative AI technologies are being actively integrated into the tourism and travel sectors.

In response to the domestic population crisis and rapid environmental changes in the AI ecosystem, we examined the policy efforts of the national and local governments from new perspectives and methodologies in an attempt to overcome regional extinction due to population decline.

First, while research in various fields using ChatGPT is already in progress, we conducted an exploratory study on its applicability to overcoming the population crisis and regional extinction, which is receiving attention as a major policy issue in Korea. Second, ChatGPT's responses are the result of machine (deep) learning using a large amount of information (big data) and basic data for comparative research with direct and indirect stakeholders (metropolitan areas, local residents, etc.). Third, we attempted to reflect the reliability of the information provided by ChatGPT as much as possible through periodic repeated measurements over a period of one year, starting from April 2023.

We considered conclusive research on ways to overcome the domestic population crisis and regional extinction by revitalizing daily life and creating a population influx in pan-tourism aspects, including the legal, infrastructure, content, program, and marketing domains. We sought to explore how ChatGPT, as a generative AI tool, can be utilized to tackle various facets of the population crisis and how its insights from a big data perspective might help mitigate population-

related challenges faced by local governments. Specifically, by focusing on policy domains or issues pertinent to regional decline, this study endeavored to evaluate ChatGPT's perceptions or assessments through an importance-effectiveness analysis.

II. Theoretical Background

A. Development and Application of ChatGPT

ChatGPT, developed by OpenAI, is an AI chatbot based on the GPT framework, a powerful large-language model that utilizes deep learning to generate human-like text (Radford et al., 2019). Since its launch, ChatGPT has gained widespread popularity and has had a significant societal impact through its natural language processing and contextual awareness (Radford et al., 2019). The latest version, GPT-4, processes both text and image inputs, thereby offering enhanced reliability and creativity (Shin and Kang, 2023).

ChatGPT's extensive training on diverse publicly accessible data enables it to generate responses on a wide range of topics (Brown et al., 2020). Its primary objective is to advance AI development in a secure and beneficial manner, while its innovative functions allow it to process large volumes of data, identify

trends, and analyze complex phenomena. This makes ChatGPT a transformative tool in various fields, including tourism and hospitality, where it improves service delivery, human resource management, and decision making (Carvalho and Ivanov, 2023; Shin and Kang, 2023).

ChatGPT can generate new ideas, forecast future trends, and assist with academic research by providing domain-specific insights (Lund and Wang, 2023). Its versatile applications include generating strategies for businesses, answering scholarly questions, and understanding the impacts of AI on industries such as higher education and tourism (Iskender, 2023).

B. Previous Research on ChatGPT and the Tourism Industry

Since 2023, much research has been conducted on the application of ChatGPT in the tourism industries of foreign countries. Thus, we analyzed the content and keywords of previous overseas studies, as shown in Table 1.

Since its introduction in 2022, ChatGPT has been used both academically and practically in various academic disciplines and industries, including tourism. Additionally, ethical issues related to generative AI systems, such as ChatGPT, have been researched (Stahl

Table 1. Previous research on ChatGPT as applied in the tourism industry

Authors (Year)	Contents	Keywords
Dalgıç et al. (2024)	The aim of the study is to elucidate the relationship between the artificial intelligence technology ChatGPT and learning outcomes in tourism education, as well as to identify how ChatGPT can play a pivotal role in shaping the future of tourism education. The research findings demonstrate that ChatGPT influences learning outcomes, with digital proficiency playing a mediating role, and personalized learning serving as a mediator in this relationship.	Tourism education, learning outcomes
Kim et al. (2023)	Through five studies, the research investigates how individuals react differently to recommendation options generated by the AI-based language model ChatGPT. Studies 1 and 2 demonstrate a tendency for people to positively respond to multiple recommendation options (60 options), revealing diverse consumer perceptions of AI-generated recommendations. Studies 3 and 4 further explain the moderating effect of recommendation agents and identify distinct patterns of consumer reactions depending on whether the recommendation arises from human or AI agents, indicating the presence of choice overload. Study 5 directly measures consumer preferences for recommendation agents, providing insights into general preferences for ChatGPT.	Recommendation agent, consumer preference

Table 1. Continued

Authors (Year)	Contents	Keywords
Nautiyal et al. (2023)	The research explores the intersection of ChatGPT and tourism studies. The findings emphasize the importance of citing sources in texts, particularly in light of concerns about AI generating potentially misleading information. It highlights the need for nuanced theoretical perspectives and practical policies regarding plagiarism, addressing authors, publishers, journal editors, universities, and course coordinators. Regarding ChatGPT's potential role as a co-author, it underscores the importance of properly attributing sources and the significance of disclosure where appropriate. It suggests establishing and regularly updating global standards for ethics and academic integrity, considering the capabilities and implications of AI, and its impact on knowledge creation and creativity.	Research ethics in tourism research, co-authorship, etc.
Shin and Kang (2023)	This study investigated the evolution, current status, and future directions of tourism research utilizing ChatGPT. Fifteen interview questions were formulated, and semi-structured interviews were conducted using ChatGPT. Through qualitative analysis of the responses, key themes pertaining to tourism research were identified, including major topics in previous studies, the influence of factors shaping research development, accomplishments, limitations, and areas requiring further exploration. The utilization of ChatGPT offers valuable insights into the latest advancements in tourism research. Furthermore, the interdisciplinary nature of tourism research significantly contributes to the progress of other academic fields.	Interdisciplinary research in tourism
Wong et al. (2023)	This study provided an initial snapshot of ChatGPT's ability to enhance the tourist decision-making process in the pre-travel, during travel, and post-travel stages. In particular, it showcases various scenarios, such as ChatGPT's potential to improve tourist experiences in three travel stages by enhancing travel planning efficiency, providing personalized recommendations, offering round-the-clock personal assistance, enabling fluent communication using AI, facilitating autonomous guided tours, and fostering rich shared experiences. The added value of autonomous driving services provides tourists with cost-effective travel solutions and offers customized information to facilitate easy travel.	Travel decision-making process improvement, Travel solutions, Personalized information

Source: Compiled by the authors.

and Eke, 2024). ChatGPT has also been employed by educators to differentiate educational technology (Cooper, 2023) and evaluate and improve educational policies (Cotton et al., 2023). Furthermore, researchers have emphasized that through ChatGPT, students can analyze the learning process, observe performance, and predict the necessary information (Ivanov and Soliman, 2023). Therefore, some researchers have suggested that ChatGPT can be effectively integrated into educational settings (Ogugua et al., 2023).

C. Previous Research on Policies to Combat Population Decline and Regional Extinction

In this section, we analyze major domestic research papers related to population decline and regional extinction over the past three years. Based on this, we attempt to derive ideas on overcoming regional extinction. The papers are listed in Table 2.

The following is an overview of major policies and issues related to depopulation and regional extinction in Korea. We categorized them into areas of policy development and administrative support, infrastructure and environment creation, content discovery and tourism product development, promotion and marketing, and other areas such as evaluation indicator development, monitoring, and research.

First, in relation to policy development and administrative support, various measures can be proposed, including expanding support for settlement fees, supporting the migration of non-agricultural workers, and increasing support for those returning to rural areas with local ties. It is also considered that one method to prevent local extinction is to increase the population of "residents and relations"

who have ties to the area, even if they do not settle in the region (Kyunghyang Shinmun, 2022). In addition, policies such as the homeland love donation system implemented in 2023, tourist incentive systems (vouchers), digital tourism residency cards, and interregional relay visits by tourists have also been proposed.

Second is the creation of infrastructure and environment. The focus is on harnessing landmarks and unique venues as tourist resources, including suspension bridges, skywalks, monorails, hotspots, and film locations. National landmarks and unique venues, such as Tongyeong, Yeosu, Wonju, Cheongju, and Yesan, have become tourist attractions. Additionally, there is an emphasis on expanding lifestyles and sports facilities. This involves concentrating and operating lifestyle service hubs containing everyday life service functions, such as medical care, welfare, and shopping

Table 2. Analysis results of major studies over the past three years (2021-2023)

Authors (Year)	Contents	Keywords
Gu (2021)	A regional and spatial approach so that the young population can receive quality "education" in local areas, maintain appropriate "jobs" and "income," have stable "housing," enjoy "cultural" benefits comparable to those in the metropolitan area, and "educate their children," with interdisciplinary research and policy alternatives.	culture (space, events, etc.)
Gyeonggi Research Institute (2022)	For the development of Gapyeong-gun, "regional growth" to attract the younger generation and "regional adaptation" to create comfortable and safe living conditions for the elderly and middle-aged are being implemented in parallel. For example, projects to attract relevant populations, including "living for a month" using empty houses and closed pensions.	rural regeneration project
Kim (2021)	A compact city-type "youth-friendly city" (tentative name) was formed as a response strategy to local population decline (Danyang-gun). Expansion of local-led youth job creation projects centered on the tourism industry (Yanggu-gun and Cheorwon-gun). Encouraging the relocation of families of military officers due to development limitations (relocation subsidies, etc.)	youth entrepreneurship, move-in subsidy
Yu et al. (2021)	This study aims to explore the extinction risk of local cities and counties in Korea. For analysis, it uses factors that affect the risk of extinction or the attractiveness of the region. and data is collected and organized in the KOSIS. In conclusion, to overcome local extinction in the future, local governments in danger of extinction need to focus first on these economic and industrial factors improved, and if those factors are overcome, it is important to expand cultural and medical facilities to enhance local attractiveness.	lifestyle culture (complex community)
Cho (2022)	Japan's 5th Act on Response to Areas at Risk of Local Extinction recognizes the new concept of relevant population and seeks to increase the relevant population of areas at risk of extinction. In particular, the support measures specified in the law include securing and nurturing human resources, promoting industry, promoting tourism and promoting exchanges, etc., under the goal of depopulation measures.	tourism promotion (infra, program)
Korea Research Institute for Local Administration (2021)	Establishment of a population DB system, collaboration between institutions, integrated development of urban and rural areas, development of regional metropolitan areas, youth inflow policy, role of local universities, response to regional extinction, correct planning and execution of funds, best practices, strengthening support.	local extinction response fund, discovering excellent cases
Korea Research Institute for Local Administration (2023)	This study was conducted to help regions facing population decline strategically seek policies to revitalize living populations. The developed indicator system and case analysis results can be used as basic data for establishing strategies to revitalize living populations in each region in the future, and are expected to play an important role in promoting the sustainable development of local communities.	living population, indicators

Source: Compiled by the authors.

in places with good accessibility (Korea Research Institute for Local Administration, 2019).

The third area includes the fields of content discovery and tourism product development. It will introduce or expand agricultural, mountainous, and fishing village experience programs aimed at urban residents who wish to return to rural areas. Additionally, agricultural and rural exchange programs aim to solve the problem of small-scale school closures in rural areas and introduce innovative rural volunteer activities through working holiday programs for locals (Hankook Ilbo, 2022). Moreover, there are intergenerational village-community projects. The government supports various community activities through annual community resident recruitment projects, allowing residents to explore villages and create livable communities. Efforts are needed to activate domestic survival training involving recreational sports clubs, professional sports organizations, and pro-sports groups.

Fourth is public relations and marketing. This involves continuous promotion through TV and media. Local attractions are gaining popularity because of well-produced content. Additionally, there are joint tourism promotion activities between local governments. Moreover, the promotion of local Korean heritage festivals has had a positive effect (Kang and Kyoung-

Bae, 2023). Essentially, the direction of these strategies resembles the concept of sustainable rural tourism practices emphasized by Chan (2023).

Fifth, it is necessary to develop new joint evaluation indicators for local government assessments and to engage in ongoing research and monitoring efforts aimed at overcoming population decline and regional depopulation. Efforts such as idea competitions are also needed to revitalize and recover regions through an influx of residential populations (Han, 2023).

III. Methodology

A. Variable Extraction and Research Model

Figure 1 shows the variable extraction process and the research model adopted in this study.

For the survey design, item development, and sample selection, approximately 20 relevant research papers published domestically since 2020 were reviewed along with reports from institutions such as the Korea Research Institute for Local Administration (2022) and Korea Rural Economic Institute (2021) (with more than 10 reports), as well as over 50 news articles.
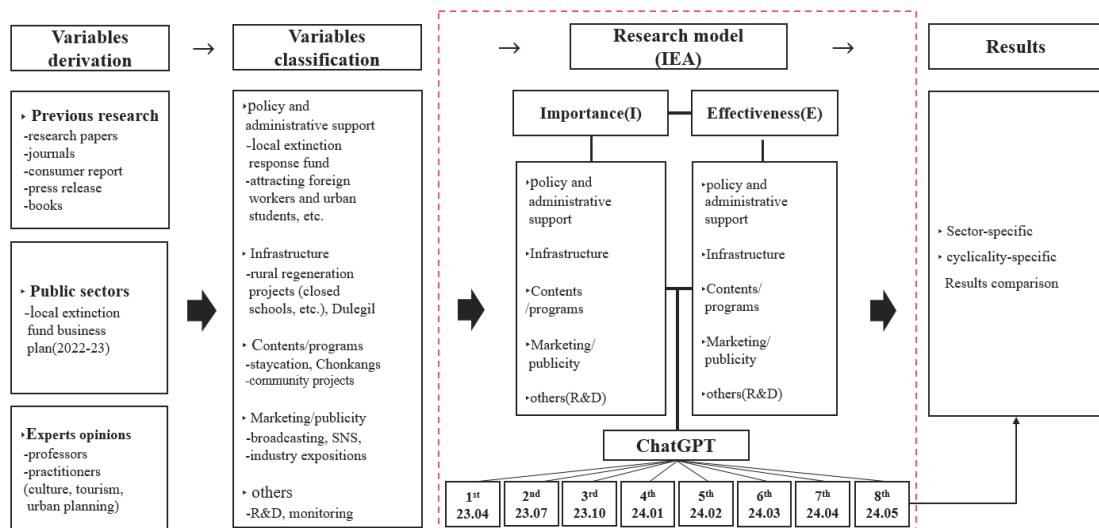

Figure 1. Variable extraction and research model

Recent issues were confirmed by visiting rural fairs for newcomers and returnees. Subsequently, the main contents of project plans related to countermeasures against local extinction were analyzed. In this study, 47 new and existing policy-related variables related to local extinction were extracted. These ideas were categorized by field through in-depth discussions and exchanges of opinions with experts, including university professors and industry practitioners. After excluding miscellaneous items, 42 items were finalized as the survey questions.

Based on the content described earlier, this study focused on the following research questions:

RQ1: How does ChatGPT evaluate or recognize the importance and effectiveness of sector-specific policies (policy, infrastructure, content, and publicity) in the pan-tourism aspects of overcoming population decline and regional extinction?

B. Research Design through Inquiries with OpenAI's ChatGPT

Several steps were taken to conduct the investigation through dialogue with OpenAI's ChatGPT. First, registration was completed around November 2022, when ChatGPT was released (GPT-3.5). Second, over approximately three months, after determining the questionnaire and variables based on prior research on domestic population decline and regional depopulation, the survey was finalized with modifications and improvements. Third, conversations with ChatGPT were conducted using the questions presented in the final questionnaire. In April 2023, an initial assessment was conducted regarding the importance and effectiveness of all 42 questions. A Likert-style five-point scale was used for the evaluation. Before the actual questions, the understanding of the severity of domestic population decline and regional depopulation, the awareness of the importance and effectiveness, and the Likert five-point scale were assessed. Subsequently, measurements were repeated every three months until October 2023, and then monthly

from January 2024 onward, totaling eight rounds of analysis using ChatGPT. The rationale for conducting this longitudinal study was to address the ongoing discussions regarding the accuracy and reliability of the results generated by ChatGPT. The researchers also agreed that there was a need for more accurate and reliable results regarding population decline and regional depopulation.

IV. Empirical Analysis

A. ChatGPT Analysis Process and Results

The following is an excerpt from a dialogue with the generative AI ChatGPT regarding questions and answers related to population decline and regional depopulation across different fields. A more detailed examination is presented in Figure 2.

As shown in Figure 2, ChatGPT was asked to rate the importance of regional promotion and marketing activities in the field of pan-tourism related to domestic population decline and regional depopulation using a five-point Likert scale. The response, along with the rationale, is presented below. The response indicated that ChatGPT rated the importance of regional promotion and marketing activities as "5 (very important)." It is important to note that during repeated measurements, the questions were asked in English and the same individual question content had to be consistently presented with each repetition to obtain accurate results. Thus, for each measurement, basic conversations and analysis processes were conducted to enhance the understanding of specific items (such as the Hometown Love Donation System, Regional Depopulation Response Fund, Sports-Cation, etc.). Through 8 repeated measurements, approximately 420 questions and responses were obtained.

The following is an analysis of the effectiveness of regional promotion and marketing activities in the pan-tourism sector related to population decline and regional depopulation based on questions and answers using the generative AI ChatGPT. A more

detailed examination is presented in Figure 3.

As shown in Figure 3, questions were posed to ChatGPT regarding the effectiveness of regional promotion and marketing activities in the pan-tourism sector related to domestic population decline and regional depopulation, using a five-point Likert scale for evaluation. The response indicated that ChatGPT rated the effectiveness of regional promotion and marketing activities as "5 (very effective)." Additional explanations and reasons for this evaluation are
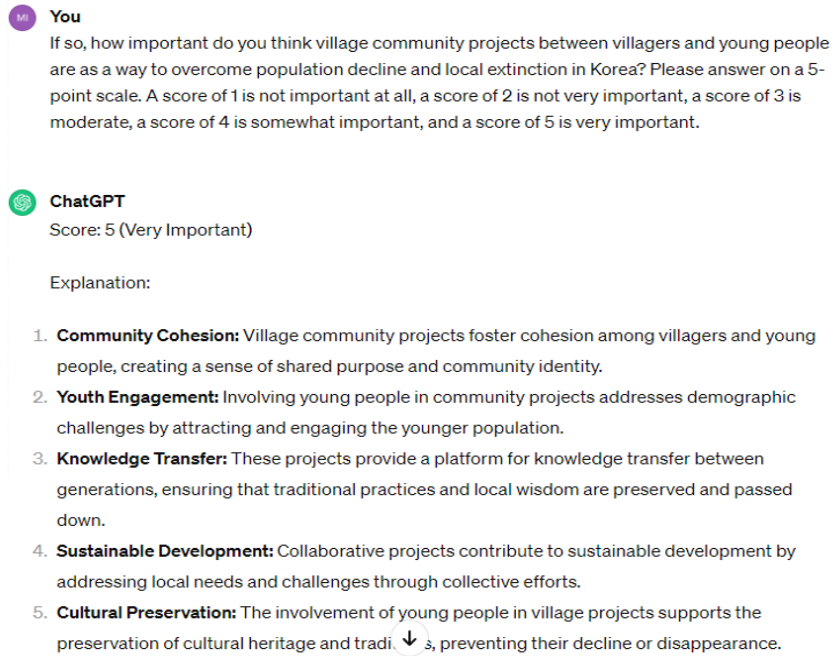
You
If so, how important do you think village community projects between villagers and young people are as a way to overcome population decline and local extinction in Korea? Please answer on a 5-point scale. A score of 1 is not important at all, a score of 2 is not very important, a score of 3 is moderate, a score of 4 is somewhat important, and a score of 5 is very important.

ChatGPT
Score: 5 (Very Important)

Explanation:

1. **Community Cohesion:** Village community projects foster cohesion among villagers and young people, creating a sense of shared purpose and community identity.
2. **Youth Engagement:** Involving young people in community projects addresses demographic challenges by attracting and engaging the younger population.
3. **Knowledge Transfer:** These projects provide a platform for knowledge transfer between generations, ensuring that traditional practices and local wisdom are preserved and passed down.
4. **Sustainable Development:** Collaborative projects contribute to sustainable development by addressing local needs and challenges through collective efforts.
5. **Cultural Preservation:** The involvement of young people in village projects supports the preservation of cultural heritage and tradit↓ s, preventing their decline or disappearance.

Figure 2. ChatGPT response analysis result of the content discovery and tourism product development importance (example)

You
If so, how effective do you think joint tourist attraction activities among local governments, such as fairs, are effective as a way to overcome population decline and local extinction in Korea? Please answer on a 5-point scale. A score of 1 is not effective at all, a score of 2 is not very effective, a score of 3 is moderate, a score of 4 is somewhat effective, and a score of 5 is very effective.

ChatGPT
Joint tourist attraction activities among local governments, such as fairs, are **very effective (5)** as a way to overcome population decline and local extinction in Korea. By collaborating and pooling resources, local governments can create vibrant and engaging events that draw in visitors from various regions. These activities not only showcase the unique cultural heritage, traditions, and products of different areas but also foster a sense of community and pride. Additionally, they encourage tourism, stimulate the local economy, and create opportunities for sustainable growth, making them highly effective in addressing the challenges of population decline and local extinction.
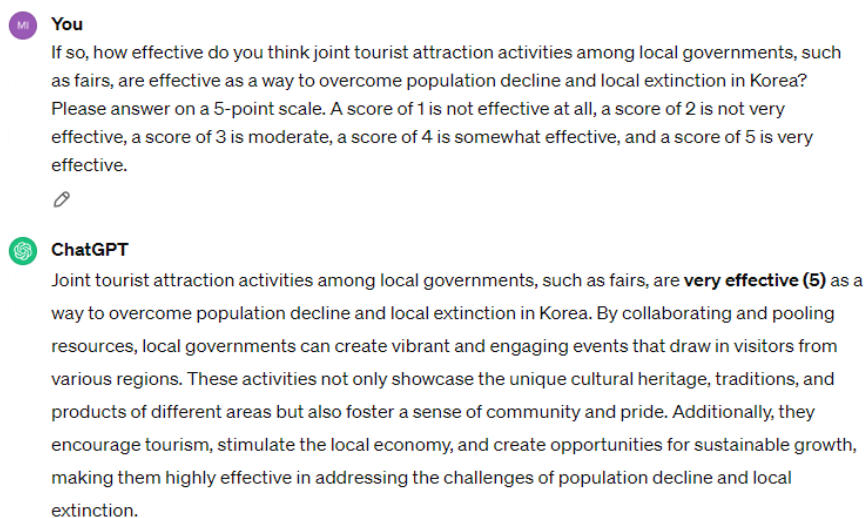
Figure 3. ChatGPT response analysis result on the effectiveness of regional promotion and marketing activities (example)

provided below. As shown in Table 2, the response highlighted that collaborative and integrated efforts among regions can attract diverse visitors through vibrant and attractive events, showcasing the unique cultural heritage, traditions, and products of various regions while fostering community spirit and pride. It also suggested that such activities are highly effective in encouraging tourism, stimulating the local economy, and creating opportunities for sustainable growth, thereby addressing the issues of population decline and regional depopulation.

B. Analysis Results

1. General solutions

The general strategies proposed to address population decline and regional depopulation are described below. These include attracting large and medium-sized enterprises, providing high-quality jobs, and matters related to education (e.g., local universities) and cultural services. Table 3 presents the results.

As shown in Table 3, with regard to general strategies to address population decline and regional depopulation, ChatGPT generally evaluated or perceived importance (average = 4.78) and effectiveness (average = 4.52). It can be observed that individual items were rated (perceived) as 4-5 in terms of both importance and effectiveness. In particular, the importance of providing high-quality jobs as well as issues related to healthcare (hospitals, etc.), housing (real estate), and childcare were rated very highly (5). Additionally, the effectiveness of providing high-quality jobs, along with education and cultural services, healthcare (hospitals, etc.), and childcare was also rated highly (4.8). While some items showed a consistent pattern in perception or evaluation values across iterations, there were also items for which perception values increased or decreased across iterations.

2. Solutions from pan-tourism aspects

The following is an attempt to analyze the multidimensional aspects of addressing population decline and regional depopulation in the context of tourism across different fields. These include policy development and administrative support, infrastructure and environmental development, content discovery, and the development of tourism products.

Table 3. Analysis of common solutions (N=112, 8times)

Items	Importance									Effectiveness								
	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean
	23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05		23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05	
1) Attracting large and medium-sized enterprises	4	5	4	5	4	5	4	5	4.5	4	4	4	5	4	4	4	4	4.1
2) Providing high-quality jobs	5	5	5	5	5	5	5	5	**5.0**	4	4	5	5	5	5	5	5	**4.8**
3) Education (universities, etc.) and cultural services	4	5	5	5	5	5	5	5	**4.8**	4	5	5	5	5	4	4	5	**4.6**
4) Medical (hospitals, etc.) services	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	5	5	4	5	**4.7**
5) Housing (real estate, etc.) issues	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	4	4	5	5	**4.6**
6) Childcare (kindergartens, postnatal care centers) issues	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	5	5	5	5	**4.8**
7) Utilization of regional revitalization funds	4	5	5	4	4	4	3	4	4.1	4	5	5	4	4	4	3	4	4.1
Mean					4.78									4.52				

First, we analyzed the results on the importance and effectiveness of policy formulation and administrative support for tourism, as shown in Table 4.

As shown in Table 4, ChatGPT evaluated the importance (average 4.24 points) and effectiveness (average 4.07 points) of tourism-related measures to address population decline and regional extinction relatively positively. Specifically, initiatives such as creating jobs and supporting startups for local youth (5), expanding support for returning to rural areas (4.6), increasing the recruitment of foreign workers and urban exchange students (4.5), and providing job support for retirees (4.5) were highly rated in terms of importance. Similarly, initiatives such as supporting local youth employment and start-ups (4.8), expanding relationships and residential populations (4.7), and expanding support for returning to rural

areas (4.4) were perceived as highly effective. However, initiatives such as relay visits between regions by tourists, digital tourism residency cards, and hometown love donation programs have been relatively low in importance and effectiveness since their implementation. For individual items, values of 3.5 or 4.5 for individual items show that ChatGPT's response values for specific questions were not clearly defined and were provided as a range (3-5), resulting in the average values presented.

Second, we analyzed the importance and effectiveness of the infrastructure and environmental aspects of pan-tourism. Table 5 presents the results.

As shown in Table 5, ChatGPT evaluated the importance (4.27) and effectiveness (4.16) of measures related to infrastructure and environmental development relatively positively. Specifically, initiatives such as

Table 4. Analysis results of policy development and administrative support (N=220, 8 times)

Items	Importance									Effectiveness								
	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean
	23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05		23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05	
1) Support for local youth employment and startups	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	5	5	5	5	**4.8**
2) Expansion of sisterhood ties (interregional and intergenerational)	4	5	5	5	5	4	4	4	**4.5**	3	5	5	4	4	4	4	4	4.1
3) Incentives for tourists (vouchers, etc.)	3	4	3	4	4	3	3	3	3.3	4	4	4	4	4	4	3	3	3.7
4) Support for outbound migrant settlement (settlement fees, etc.)	5	5	5	5	5	4	4	4	**4.6**	4.5	5	5	4	4	4	4	4	4.3
5) Expansion of support for ancestral returnees to farming or rural areas	3.5	5	5	5	5	4	4	5	**4.6**	3.5	5	5	5	5	4	4	4	**4.4**
6) Expand relationships and life demographics (work, school, military, etc.) (half a world away)	3.5	5	5	5	5	5	5	5	**4.8**	4	5	5	5	5	5	4	5	**4.7**
7) Expansion of attracting foreign workers and urban exchange students: public-private cooperation	4	5	5	5	5	4	4	4	**4.5**	3	5	5	5	5	4	4	4	**4.3**
8) Support for job opportunities for retirees (pre-retirement age)	4	5	5	5	5	4	4	4	**4.5**	3	5	5	5	4	3	3	4	4.0
9) Interregional relay visits for tourists	3	4	5	4	3	3	3	3	3.5	4	5	4	4	4	3	3	3	3.
10) Digital tourism resident card	3.5	5	4	4	4	4	4	3	3.9	3.5	3	3	3	4	3	4	3	3.3
11) Hometown love donation system	3.5	3	3	4	5	3	3	4	3.5	3	3	4	4	4	3	3	4	3.5
Mean					**4.24**									**4.07**				

Table 5. Analysis results of infrastructure and environment composition (N=128, 8 Times)

Items	Importance									Effectiveness								
	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean
	23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05		23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05	
1) Development of rural housing complexes for seniors, retirees, etc.	4	5	5	5	5	4	4	5	**4.6**	4	4	4	5	4	4	4	4	4.1
2) Rural (urban) regeneration projects (conversion of vacant houses, etc.)	5	5	5	5	5	5	5	5	**5.0**	4	4	4	5	5	5	4	4	**4.5**
3) Second home (for vacation)	2	2	3	4	4	3	2	3	2.8	2	2	4	4	4	3	2	4	3.1
4) Utilization of landmarks and unique venues for tourism (suspension bridges, filming locations, etc.)	3	4	5	5	5	4	4	4	**4.2**	4	4	5	5	5	4	4	5	**4.5**
5) Expansion of weekend farm operations (between urban and rural areas)	3	4	5	4	5	3	3	4	3.8	4	4	4	4	4	4	4	4	4.0
6) Expansion of lifestyle and cultural facilities, sports facilities	4	4	5	5	5	5	4	4	**4.5**	4	4	5	5	4.5	5	4	5	**4.5**
7) Repurposing of closed schools (creation of mixed-use communities)	4	4	5	5	5	5	4	4	**4.5**	4	4	5	5	4	4	4	5	**4.3**
8) Creation of local connecting routes (walking paths, bike trails)	5	5	5	5	5	5	4	5	**4.8**	4	3	5	5	5	4	4	5	**4.3**
Mean					**4.27**									**4.16**				

creating rural or retirement housing complexes (4.6); rural (urban) revitalization projects (5.0); expanding lifestyle, cultural, and sports facilities (4.5); and creating local connecting routes (walking paths and bike trails) (4.8) were highly rated. Similarly, landmark and unique venue tourism resource utilization (4.6); expanding lifestyle, cultural, and sports facilities (4.5); and creating regional circular (bicycle) trails (4.4) also showed somewhat high effectiveness. However, the importance (2.8) and effectiveness (3.1) of second homes were relatively low.

Third, we present the results of the analysis of the importance and effectiveness of the infrastructure and environmental aspects of pan-tourism in Table 6.

As shown in Table 6, ChatGPT demonstrated varied perceptions (ranging from 3 to 5 points) regarding the importance (4.12) and effectiveness (4.01) of measures related to content exploration and tourism product development. Specifically, the importance and effectiveness of intergenerational

village community projects (4.8/4.6), activating tourist circuits (4.8/3.8), small-scale events and seasonal festivals (4.3/4.3), expanding agricultural and rural experience programs (4.5/4.2), and developing premium content and storytelling (4.1/4.2) were evaluated relatively highly. However, initiatives such as living in local areas for a week (or a month) (3.7/3.5), religious facilities and pilgrimage route programs (3.1/3.6), and sports-cations including wilderness training (4.0/3.8) were relatively low.

In the following section, we discuss the results of our analysis of the importance and effectiveness of local promotion and marketing activities from a pan-tourism perspective. Table 7 presents the results.

As shown in Table 7, ChatGPT evaluated the importance (4.68) and effectiveness (4.78) of measures to overcome regional decline through local promotion and marketing activities very highly. Specifically, the importance and effectiveness of activities such as promotion through TV and media (4.2/4.3), utilizing

Table 6. Analysis results of content discovery and tourism product development (N=220, 8 times)

Items	Importance									Effectiveness								
	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean
	23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05		23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05	
1) Living in rural areas for a week (or a month)	3	3	5	4	3	4	4	4	3.7	3	3	4	4	4	3	3	4	3.5
2) Discovery of long-term stay programs (Staycation, Workation, etc.)	4	3	5	5	4	4	4	4	4.1	4	3	5	5	4	4	4	4	4.1
3) Expansion of agricultural, rural, and fishing village experience programs (village vacations, etc.)	4	5	5	5	4	4	4	5	**4.5**	4	3	5	5	4	4	4	5	4.2
4) Working holidays (local): Innovative rural volunteer activities	4	3	5	4	4	4	4	4	**4.0**	4	3	5	4	4	4	4	4	4.0
5) Intergenerational village community projects	5	3	5	5	5	5	5	5	**4.8**	4	3	5	5	4	5	4	5	**4.6**
6) Small-scale events and seasonal festivals	4	5	5	5	4	4	4	4	**4.3**	4	5	5	5	4	4	4	4	**4.3**
7) Activation of tourist trails	5	5	5	5	4	5	5	5	**4.8**	4	3	4	5	3	4	4	4	3.8
8) Religious facilities and pilgrimage route programs	3	3	3	3	3	3	3	4	3.1	4	3	4	3	4	3	4	4	3.6
9) Forest (healing, therapy) programs	3	3	5	5	4	4	4	4	4.0	4	3	5	5	4	4	4	4	4.1
10) Sports vacations (sports activities and intensive training programs)	3	3	5	5	4	4	4	4	4.0	3	3	5	5	3	4	4	4	3.8
11) Development of premium content (century-old stores, etc.) and storytelling	4	3	5	4	4	4	4	5	4.1	4	5	5	4	4	4	4	4	4.2
Mean					4.12									4.01				

Table 7. Analysis of regional promotion and marketing activities (N=80, 8 times)

Items	Importance									Effectiveness								
	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean	1st	2nd	3rd	4th	5th	6th	7th	8th	Mean
	23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05		23.04	23.07	23.10	24.01	24.02	24.03	24.04	24.05	
1) Continuous promotion through TV and media (prime-time programs like "My Hometown at 6" or "Around the Neighborhood")	4	3	5	5	4	5	4	4	4.2	3	5	5	5	4	4	4	4	**4.3**
2) Utilization of power bloggers and influencers on social media	4	5	5	5	4	5	4	4	**4.5**	4	5	5	5	4	5	4	4	**4.5**
3) Joint activities between local governments to attract tourists (exhibitions, etc.)	4	5	5	5	4	5	5	5	**4.7**	4	5	5	5	4	4	4	4	**4.3**
4) Activation of joint evaluation visits to attract visitors and discover and evaluate excellent cases	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	4	5	4	5	**4.6**
5) Ongoing monitoring and research of areas facing depopulation	5	5	5	5	5	5	5	5	**5.0**	4	5	5	5	5	5	5	5	**4.8**
Mean					4.68									4.78				

power bloggers and influencers on social media (4.5/4.5), and joint efforts between local governments to attract tourists (4.7/4.3) were rated highly across almost all items. This highlights the significance of regional promotion and marketing activities as a way to solve population decline and regional extinction, and provides an opportunity to re-evaluate their importance.

V. Conclusions

A. Summary and Conclusions

Interest from government bodies, local authorities, and domestic and international media in understanding the causes of and solutions to Korea's population crisis is growing steadily. The New York Times addressed this crisis in an editorial titled "Is South Korea Disappearing?" and proposed solutions centered on attracting resident populations, an idea echoed by officials from the Ministry of Public Administration and Security. Similarly, efforts to combat population decline and regional extinction have been proposed, such as increasing related and resident populations, as suggested by the Korea Rural Economic Institute in 2021. Recent initiatives by Statistics Korea include a pilot project to categorize resident populations into various types, such as tourism-oriented populations, as exemplified in locations such as Danyang and Boryeong. Efforts are now underway to officially identify the resident populations in the 89 areas that are experiencing population decline nationwide starting this year. Recognizing that sudden population growth policies are impractical, there is a growing consensus on the need for long-term and intermediate policies or strategies to address the domestic population crisis.

A balanced approach is required to address this crisis effectively, combining continuous, long-term perspectives (Track 1) with a strategy focused on increasing living and resident populations (Track 2). Relying solely on sudden population growth policies is inadequate and requires alternative policies that

yield short-term effects. Central to this approach is the concept of living resident populations, which include various groups such as tourists staying for extended periods, commuters, students, and foreign workers. Tourism activities involving voluntary stays are vital for regions facing population decline and serve as a lifeline for revitalizing these areas.

ChatGPT has received worldwide attention since its launch in November 2022 and has been used in various fields, both domestically and internationally. This study presented research results from collaborative work with OpenAI's ChatGPT, seeking evaluation from experts in academia and industry. Specifically, it aimed to evaluate strategies for overcoming domestic population decline and regional extinction using ChatGPT. This study proposed strategies tailored to each local government through importance and effectiveness analyses to establish and apply executable strategies.

Summarizing the analysis results for RQ1, within coping strategies from a pan-tourism perspective, the importance of local promotion and marketing activities was significant in the evaluations conducted by ChatGPT. Policy development, administrative support, infrastructure, and environmental enhancements also received high evaluations. Although their effectiveness was slightly lower than their importance, similar trends were observed.

Rural and urban regeneration projects (such as renovating vacant houses), establishing local connectivity paths (walking trails), and creating bicycle lanes were highly valued for infrastructure and environmental enhancement. The effectiveness of landmarks and unique venue tourism resources (such as suspension bridges and filming locations), as well as the expansion of lifestyle, culture, and sports facilities, was also significant. Conversely, content exploration and tourism product development were rated lower in importance and effectiveness. However, intergenerational community projects and the revitalization of traditional village activities were rated as highly important, whereas small-scale events and seasonal festivals were rated as highly effective. Local promotion and marketing activities were evaluated slightly higher in terms of

both importance and effectiveness.

This study has several implications and expected effects. First, it highlights collaborative efforts to propose coping strategies for the domestic population crisis using ChatGPT. Second, it presents responses obtained through dialogues with ChatGPT in longitudinal research for the first time. Third, future follow-up studies utilizing approaches such as Importance-Performance Analysis on a five-point scale can utilize this research as a guide for potential applications.

B. Discussions and Future Research

This study is highly significant as it explored short-term and effective policies to address the population decline crisis and regional extinction from a pan-tourism perspective and evaluated these policies using ChatGPT. However, several of these aspects require further investigation.

First, it is important to consider whether researchers accept the values suggested by ChatGPT. Alternative methods for validation are needed, such as qualitative interviews with a small number of experts in relevant fields or quantitative assessment of a minimal sample group (n=30) to gauge agreement with the results. Additionally, comparative analyses using other AI models such as BERT, GPT-3, Bing, and CloverX can improve the reliability. Future research is needed to navigate these processes and validate our findings.

Second, the reliability of the analytical results from ChatGPT must be assessed. If the reliability is in question, measures such as repeated measurements on a biannual, quarterly, or monthly basis, or group experimental designs (e.g., experiments with students in a computer lab), can be implemented. This study conducted measurements on a monthly basis to ensure reliability.

Future research should focus on continuous and periodic longitudinal studies using generative AI models such as ChatGPT. These studies should secure reliability through comparative studies involving stakeholders related to population decline, including

residents of metropolitan and declining areas and Generation MZ. Efforts should also be made to propose tailored and concrete policies at the regional level to sustainably and effectively address population decline.

This study provides the opportunity to formulate genuine policy efforts to address population decline and foster awareness among local communities. This could empower residents to develop strategies to overcome these challenges.

Acknowledgments

References

Brown, T., Mann, B., Ryder, N., Subbiah, M., Kaplan, J. D., Dhariwal, P., ... Amodei, D. (2020). Language models are few-shot learners. *Advances in Neural Information Processing Systems, 33*, 1877-1901.

Carvalho, I., & Ivanov, S. (2024). ChatGPT for tourism: Applications, benefits and risks. *Tourism Review, 79*(2), 290-303.

Chan, J. K. L. (2023). Sustainable Rural Tourism Practices from the Local Tourism Stakeholders' Perspectives. *Global Business & Finance Review, 28*(3), 136-149.

Cho, K.H. (2022). Japan's 5th Act on Response to Areas at Risk of Local Extinction. *Latest Foreign Legislation Information, 167,* 1-6.

Cooper, G. (2023). Examining science education in ChatGPT: An exploratory study of generative artificial intelligence. *Journal of Science Education and Technology, 32,* 444-452. doi:10.1007/s10956-023-10039

Cotton, D. R., Cotton, P. A., Shipway, J. R. (2023). Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in Education & Teaching International, 61*(2), 1-12. doi:10.1080/14703297.2023.2190148

Dalgıç, A., Yasar, E., Demir, M. (2024). ChatGPT and learning outcomes in tourism education: The role of digital literacy and individualized learning. *Journal of Hospitality, Leisure, Sport & Tourism Education, 34*, 100481. doi:10.1016/j.jhls

te.2024.100481

Dong-A Ilbo. (2023), U.S. Court Says AI Creations Without Human Intervention Don't Get Copyright Protection. https://www.donga.com/news/It/article/all/20230821/120 797668/1

Gu, Y.M. (2021). Regional imbalance in population change and urban decline: Implications for low birth rate and regional extinction. *Journal of National Geography, 55*(3), 301-320.

Gyeonggi Research Institute. (2022). The future of Pocheon, Yeoncheon, and Cheorwon through global geopark cooperation. http://www.kyeongin.com/vote/view.php?ke y=20211222010003802

Han, H. (2023). The Issue of Regional Disappearance in the Era of Regionalization and the Activation of Pan-Living Tourism Population Exchange. In *2023 Proceedings of the 45th Spring Conference of the Korean Hotel and Tourism Association* (pp. 13-51).

Hankook Ilbo. (2022). Cho Hee-yeon's Unconventional Initiative "Make Study Abroad 'Semi-Mandatory' for Seoul Elementary School Students in Rural Areas. https://m.hankookilbo.co m/News/Read/A2022080714470003288

Iskender, A. (2023). Holy or unholy? Interview with open AI's ChatGPT. European Journal of Tourism Research, 34, 3414-3414.

Ivanov, S., & Soliman, M. (2023). Game of algorithms: ChatGPT implications for the future of tourism education and research. *Journal of Tourism Futures, 9*(2), 1-8. doi:10.1108/JTF-02-2023-0038

Jean Mackenzie. (2024). Why South Korean women aren't having babies. https://www.bbc.com/news/world-asia-68 402139

Kang, S., & Kyoung-Bae, K. (2023). Sustainability for the festival policy: Focused on community and visitors. *Global Business & Finance Review, 28*(1), 72-87.

Kim, H. (2021). *Research on response strategies to local population decline* (National Assembly Budget Office, 2021 Research Service Report). pp. 1-128.

Kim, J., Kim, J.H., Kim, C., & Park, J. (2023). Decisions with ChatGPT: Reexamining choice overload in ChatGPT recommendations. *Journal of Retailing and Consumer Services, 75*, 103494. doi:10.1016/j.jretconser.2023.103494

Korea Policy Briefing. (2023). Supporting the beginning of the local era! https://www.korea.kr/news/estNewsView.d o?newsId=148917558&cateId=people_news&sectId=PE _SEC_1_EDS0206002&tblKey=PMN&pWise=sub&p WiseSub=J1

Korea Research Institute for Local Administration. (2019). *Study to develop a comprehensive plan to address regional population decline* (Policy Research). pp. 1-275.

Korea Research Institute for Local Administration. (2021). Response to local extinction to overcome the national crisis. *Local Autonomy Issues and Forums, 39*, 1-57.

Korea Research Institute for Local Administration. (2023). *Indicator discovery and case analysis to support areas with population decline - Targeting living population pilot areas* (Self-Study 23-6) pp. 1-189.

Korea Rural Economic Institute. (2021). *2020 farming and rural village panel survey results* (R 919 Research Data-1). pp. 1-176.

Kyunghyang Shinmun. (2022). Work where you want to live vs. live where you want to work. https://m.khan.co.kr/n ational/national-general/article/202208051716001#c2b

Lund, B. D., & Wang, T. (2023). Chatting about ChatGPT: how may AI and GPT impact academia and libraries? *Library Hi Tech News, 40*(3), 26-29.

Nautiyal, R., Albrecht, J. N., & Nautiyal, A. (2023). ChatGPT and tourism academia. *Annals of Tourism Research, 99*, 103544.

Ogugua, D., Yoon, S. N., & Lee, D. (2023). Academic Integrity in a Digital Era: Should the Use of ChatGPT Be Banned in Schools? *Global Business and Finance Review, 28*(7), 1-10.

Radford, A., Wu, J., Child, R., Luan, D., Amodei, D., & Sutskever, I. (2019). Language models are unsupervised multitask learners. *OpenAI blog, 1*(8), 9.

Shin, H., Kang, J. (2023). Bridging the gap of bibliometric analysis: The evolution, current state, and future directions of tourism research using ChatGPT. *Journal of Hospitality and Tourism Management, 57*, 40-47. doi:10.1016/j.jhtm.2 023.09.001

Stahl, B.C., Eke, D. (2024). The ethics of ChatGPT - Exploring the ethical issues of an emerging technology. *International Journal of Information Management, 74*, 102700. doi: 10.1016/j.ijinfomgt.2023.10 27

Statistics Korea. (2023). Homepage. https://kostat.go.kr/ansk/

Statistics Korea. (2024). Results of the "Living Population" pilot calculation for depopulated areas. https://kostat.go.kr/ board.es?mid=a10301010000&bid=246&list_no=42892 8&act=view&mainXml=Y

Yu, H. B., Tak, G. J., & Moon, J. S. (2021). A study on factors causing fat loss in Korea and ways to overcome them: Exploration through machine learning methods. *Local Government Research, 24*(1), 443-476.