Analysis of Importance and Performance of Mountain Village Revitalization Policy for Balanced Regional Development: Focused on Forestry and Agriculture Policy in 8 Regional Governments

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ABSTRACT

Background and objective: Due to the recent demographic crisis driving the extinction of certain local communities, it is necessary to promote core projects to revitalize mountain village and rural areas. Methods: This study collected a total of 443 policy projects based on major policies and major business plans in the forestry and agricultural sectors of the eight regional governments in 2021. The collected 443 policy projects related to revitalizing the mountain villages were classified by 3 experts into 5 domains in the forestry sector, which further broke down into 27 types, 3 domains in the agricultural sector, and which further broke down into 23 types, for a total of 8 domains and 50 types, and an online survey of 42 policy stakeholders was then conducted. Analysis methods were t-test and Importance-Performance Analysis (IPA), and implications were derived through comparison between forestry and agricultural sectors. Results: The analysis produced several findings. First, it was positive that many projects in the sustainability field appeared in both forestry and agricultural sectors, but it was found that the policy projects needed to be reviewed due to the lack of types corresponding to projects in the intensive promotion area. Intensive core efforts included "discovering forest cultural assets" and "creating forests to improve the environment." Second, it is necessary to pay attention to the forestry policy sector, as the forestry policy sector were generally lower in importance and performance than the agricultural policy sector. Third, the domains with high importance and performance to mountain village revitalization were "forest welfare services", "improving settlement environment", and "increasing incomes" while the domains with low importance and performance were mountain villages and forest culture areas. Conclusion: In summary, to revitalize mountain villages in response to the issue of the pending extinction of local communities, forest welfare service projects should continuously be promoted and strategic responses are required for "discovering forest cultural assets" and "creating forests for environmental improvement," which are suggested as key strategic project types.

Keywords: balanced development, extinction of local communities, forestry and agricultural policy, IPA, forest welfare services & forest culture

Introduction

Balanced regional development is being treated as an important priority in terms of social equity worldwide (Benner and Pastor, 2013). It has been suggested that the extinction of certain local communities caused by imbalances in regional development may be attributed to industrial decline, run-down infrastructure, and aging of society (Beauregard, 2009). It was also found that the higher or lower income the country, the greater the difference (Ota, 2017). South Korea, one of 37 OECD countries as of 2021, needs balanced development between regions, and should ultimately
strive for social equity through strengthening regional competitiveness and further enhancing national competitiveness. However, according to Korea Research Institute for Human Settlements (KRIHS, 2021), 37% of the 226 cities (Si) and townships (Gum, or Gu) in S. Korea will experience local extinction within the next 30 years, and it is predicted that local businesses will face a crisis due to a lack of capacity to respond to the rapid changes of the 4th industrial revolution.

The central government is trying to enable local governments to solve such problems responsibly in accordance with the full-fledged fiscal decentralization from 2020. In October 2021, the Ministry of the Interior and Safety (MOIS) prepared a system to designate 89 population-decreasing areas and grant special administrative and financial benefits to respond to the crisis of local extinction. Most of the designated 89 local areas are in agricultural and mountainous areas, and require not only the efforts of MOIS, but also policy responses from the Korea Forest Service (KFS) and the Ministry of Agriculture, Food and Rural Affairs (MAFRA). In S. Korea, 43.5% of the total land area is classified as statutory mountainous areas due to its topographical characteristics (Ko et al., 2020). However, those areas have tended to be excluded from policy benefits, as only 2.8% of the total population lives in mountain villages; they are being neglected even in the General Agricultural Fishing Village Development Project that the MAFRA has been implementing with an annual budget of 1 trillion won (Kim and Lim, 2020). In addition to these national policy project problems, factors such as reduction of forest area and population outflow have decreased the number of small communities (Eup or Myeon) in mountainous areas from 503 to 466 in the past 10 years, which is a factor accelerating the crisis of local extinction (Kim et al., 2018). Since mountain villages do not simply provide a settlement environment, but also play a functional and underlying role in food and energy production, watershed conservation, national land conservation, environmental purification, and recreation, in responding to the issue of mountain villages being at risk of extinction, it is necessary to raise a number of fundamental questions, including the following: Will the response be taken by considering only an indicator of depopulation areas, like responses to local extinction? Recent climate change and the COVID-19 pandemic are highlighting the new public benefit functions of mountain villages such as CO₂ reduction, fine dust reduction, new normal settlement space in the contactless era, and low-density culture space. Mountainous areas, where forests account for more than 70% of the area, not only hold 75% of national parks but also secure tangible and intangible forest cultural assets and ecological health. Nevertheless, depopulation, aging, and declining income levels in mountain villages have been leading to a decline in such functions. A number of studies on local extinction have recently been conducted, including studies on the causes of local extinction, and policy responses (Chung, 2019a; Kim, 2020; Kim, 2021; Moon, 2021; Lee, 2016; Yoo et al., 2021), studies on spatial approaches (Cha, 2016; Ko and Kim, 2021; Lim et al., 2018), and studies on alternative countermeasures at a regional level (Park et al., 2017; Choi, 2017; Chung, 2019b; Kim, 2019; Yun and Cho, 2021). In response to local extinction, efforts have already been made to respond at a regional level, and Ha (2017) suggested the diversification and differentiation of local autonomy in the era of local extinction. In the meantime, research has been actively conducted on rural areas responding to local extinction (Lee, 2020; Lee and Choi, 2017), while such studies on mountain villages are almost completely lacking. Among the studies on mountain villages responding to local extinction (NIFoS, 2020; Kim et al., 2021a; Kim et al., 2021b), in particular, Kim et al. (2020) suggested that the policy should be converted to increase relational population to overcome the limit of increase in settled population in response to the decrease in the population in mountain villages. Examining countermeasures pursued in Japan, which has already experienced local extinction, many previous studies on policy projects (Lee, 2017; Park et al., 2017; Kim, 2017) have been conducted. Kim et al. (2019) presented a case of mountain village revitalization targeting Japan; in particular, they reported that a change in policy business was required by suggesting the establishment of governance and the introduction of a business model for region-led regeneration (Kim and Kim, 2017, Chae and Kim, 2021). In addition, Kang et al. (2021) suggested the need to review the currently promoted projects because the review on a number of issues has been insufficient; these include whether the policies currently being promoted in the forestry sector...
are projects that respond to these changes of the times, and whether core projects are being promoted.

Targeting the forestry and agricultural projects which have been proposed for areas where the population is shrinking nationwide, and which are currently being promoted in 8 regional areas, this study aimed to respond to the crisis of extinction of local communities and to suggest a direction for establishing a policy to revitalize mountain villages for balanced national development. It was conducted by comparing types of projects, and presenting implications in comparison with the importance and performance recognized by policy stakeholders.

**Research Methods**

**Research design**

In this study, for the revitalization of mountain villages, the importance and performance of policy projects in the field of forestry and agriculture were surveyed and comparatively analyzed targeting policy stakeholders. First, 443 policy projects in the agricultural and mountainous areas of 8 metropolitan governments (Gyeonggi-do, Gangwon-do, Gyeongsangnam-do, Gyeongsangbuk-do, Jeollanam-do, Jeollabuk-do, Chungcheongnam-do, and Chungcheongbuk-do) were collected, excluding metropolitan and special cities which have no statutory mountainous areas. Second, based on the collected data, forestry and agricultural administration (AG) sectors, 8 regions, and 50 types were classified through a review by three experts. Third, a total of 50 types of survey items were prepared for 42 policy stakeholders (12 experts, 5 researchers, 25 public officials), and a 5-point Likert scale survey of importance and performance was conducted online. Since the purpose of this survey is to determine by priority the concentrated areas of policy projects related to mountain village revitalization, experts who establish and implement such policies were selected as the survey subjects. Fourth, an importance-performance t-test and an importance-performance analysis (IPA) were conducted, and then conclusions were drawn through a comparative analysis between forestry and AG sectors. The analysis model is shown in Fig. 1.

**Data collection**

Among the regional policy projects currently being promoted by 8 regional governments, excluding metropolitan and special cities that have no statutory mountainous areas, a total of 446 policy projects that can affect the revitalization of mountain villages were collected as general projects promoted by the government departments in the forestry and AG sectors. The data were evenly collected as follows: 15 projects (3.36%) in Gyeonggi-do, 90 (20.18%) in Gangwon-do, 46 (10.31%) in Gyeongsangnam-do, 46 (10.31%) in Gyeongsangbuk-do, 78 (17.49%) in Jeollanam-do, 68 (15.25%) in Jeollabuk-do, 57 (12.78%) in Chungcheongnam-do, and 57 (12.78%) in Chungcheongbuk-do, excluding Gyeonggi-do and Gyeongsangnam-do (Table 1). Of the 443 policy projects collected, 173 (38.79%) in the forestry sector and 270 (61.21%) in AG were collected, indicating that there were about 1.5 times more policy projects in the AG sector than in the forestry sector (Fig. 2).
A total of 443 projects for mountain village revitalization in the forestry and AG sectors collected are classified according to their characteristics as follows. The forestry sector can be divided into five domains: boosting forestry, green infrastructure, forest welfare services, creating a regional base and forest culture tourism; while the AG sector can be divided into three domains: improving settlement conditions, increasing incomes, and strengthening regional capabilities. While the forestry sector is highly differentiated from forest product production to mountainous areas/mountain villages, the AG sector is characterized by having many revitalization projects at a regional level. Looking at the characteristics of each sector, in the forestry sector, forest welfare services, green infrastructure, and boosting forestry accounted for the majority, and were prevalent in the order of forest welfare service (32.95%), green infrastructure (27.17%), forestry industry (26.59%), creating a regional base (8.67%), and forest culture tourism (4.62%); but it was found that there were relatively few high-value-added projects, including direct projects and forest culture for mountainous areas/mountain villages. In the AG sector, it can be seen that policy projects are evenly distributed in the three areas: improving settlement conditions (39.93%), increasing incomes (32.97%), and strengthening regional capabilities (27.11%); additionally, there were relatively more types of projects directly related to regional revitalization compared to the forestry sector (Fig. 3).

Looking at the regional distribution (Fig. 4), for the forestry sector, forest welfare services account for the largest proportion in each region, and boosting forestry and creating green infrastructure also account for a large proportion. In Jeollabuk-do, forest culture tourism accounts for a relatively large proportion, but in Chungcheongnam-do and Gyeonggi-do, it accounts for almost zero. For the AG sector, it was found that the three major domains were evenly distributed, excluding Gyeonggi-do and Gyeongsangbuk-do Province where the distribution consists only of projects for improving settlement environment and increasing income. Therefore, taking Fig. 3 and Fig. 4 together, from a national perspective, it seems that even if the domains are evenly distributed, they can be excluded from potential beneficiary regions.

**Classification of policy projects for mountain village revitalization**

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**Deriving survey items**

With regard to a total of 433 policy projects in forestry and AG sectors collected previously, 5 domains in the forestry sector and 3 domains in the AG sector were classified by type through a review meeting of 3 experts, and then survey items were developed. As survey items, 5 domains in the forestry sector were divided into 27 types: 6 types of boosting forestry, 6 types of creating green infrastructure, 6 types of forest welfare services, 6 types of creating a regional base, 3 types of forest culture tourism; while 3 domains in the AG sector were divided into 23 types: 8...
types of improving settlement conditions, 8 types of increasing incomes, and 7 types of strengthening local capacity (see Table 2). The questionnaire was designed to evaluate the importance and performance of each item on a 5-point Likert scale. An online survey was conducted with 42 policy stakeholders. Based on this, we sought to determine the importance and performance of policy projects in the forestry and AG sectors, in which about 50
types have currently been promoted in relation to mountain village revitalization. Importance refers to the level of direct or indirect importance, while performance refers to the level that such projects actually contribute to expected mountain village revitalization through the implementation.

### Analysis method

In this study, paired t-test and importance-performance analysis (IPA) were used as analysis tools. Prior to a priority analysis, through a paired t-test, comparison of importance and performance in forestry and agriculture sectors was performed, and each of the 50 types was verified for significance at a level of $p < .05$.

| Category | Subject (Type) | N | Note |
|----------|----------------|---|------|
| Forestry sector (F) | Boosting forestry(F) | 6 | FF1-FF6 |
| | Creating green infrastructure(G) | 6 | FG1-FG6 |
| | Providing forest welfare service(W) | 6 | FW1-FW6 |
| | Creating a regional base(R) | 6 | FR1-FR6 |
| | Promoting forest culture tourism(C) | 3 | FC1-FC3 |
| Agriculture sector (A) | Improving settlement environment(S) | 8 | AS1-AS8 |
| | Increasing incomes(I) | 8 | AI1-AI8 |
| | Strengthening local capacity(C) | 7 | AC1-AC7 |

| Total | 23 |

Table 2. Classification of policy projects in the forestry & agriculture sectors by 8 regional governments in 2021
IPA was first used as a tool for analyzing performance by Martilla and James (1977). Since then, it has been used to determine satisfaction and set priorities in various fields, and recently it is also being used as a tool for policy analysis. So et al. (2019) analyzed the importance and satisfaction of local decentralization policies through IPA, and Bae et al. (2019) used IPA to analyze the priority of promotion policies for agri-healing services. IPA expresses each item as a scatter diagram after setting the importance as the Y-axis and the performance as the X-axis on a two-dimensional plane. Quadrant 1, which has both high importance and performance, is the "Keep Up the Good Work (KU)" quadrant, which requires efforts to maintain the status quo and gradually improve it. Quadrant 2, which has high importance but low performance, is the "Concentrate Here (CH)" quadrant that requires active improvement efforts. Quadrant 3, "Low Priority (LP)," which has both low importance and performance, has a need for improvement, but a low priority, while Quadrant 4, which has low importance but high performance, is the "Possible Overkill (PO)" quadrant, in which the status quo should be maintained but excessive effort or resource investment should be avoided (see Fig. 5).

Results

Characteristics of respondents

There were a total of 42 respondents, including 25 public administrators (59.52%), 12 experts (28.57%), and 5 researchers (11.90%) related to mountain village revitalization. The average number of years of service of the respondents was 15.24 years (± 10.04) for public administrators, 11.58 years (± 8.97) for experts, and 16.8 years (± 9.98) for researchers, an average of 14.38 years (± 9.69). Their average number of years of service was found to be high, indicating

| Category            | N   | Percentage | Tenure |   |
|---------------------|-----|------------|--------|---|
|                     |     |            | Mean   | SD |
| Public officer      |     |            |        |    |
| forest resources    | 4   | 9.52%      | 17.50  | 10.279 |
| agricultural policy | 7   | 16.67%     | 11.14  | 11.335 |
| forest recreation   | 5   | 11.90%     | 12.60  | 11.149 |
| forest green space  | 4   | 9.52%      | 20.75  | 9.069 |
| forest income       | 3   | 7.14%      | 20.67  | 9.452 |
| forest industry     | 2   | 4.76%      | 12.50  | 3.536 |
| Sub total           | 25  | 59.52%     | 15.24  | 10.04 |
| Researcher          |     |            |        |    |
| professor           | 3   | 7.14%      | 23.67  | 3.215 |
| researcher          | 2   | 4.76%      | 6.50   | 4.950 |
| Sub total           | 5   | 11.90%     | 16.80  | 9.985 |
| Expert              |     |            |        |    |
| company             | 7   | 16.67%     | 16.71  | 7.610 |
| public institutions | 5   | 11.90%     | 4.40   | 4.879 |
| Sub total           | 12  | 28.57%     | 11.58  | 8.969 |
| Total               | 42  | 100%       | 14.38  | 9.69  |

Fig. 5. IPA analysis model.

Table 3. Demographic characteristics of policy stakeholders
that they had representativeness in policy making and credibility as experts (Table 3).

IPA comparison analysis
The results of IPA in forestry and AG sectors are as follows (see Fig. 6). A total of 22 types belonged to the KU area (Quadrant 1), which has both high importance and performance: FF1, FF2, FF3, FG6, FW1, FW3, FW4, FW6, FR1, FR2, FR6, and FC2 in the forestry sector; and AS1, AS3, AI1, AI4, AI5, AI6, AI7, AC1, AC2, and AC6 in the AG sector. The types corresponding to Quadrant 1 are projects in which it is necessary to maintain the status quo or strengthen strategies. Boosting forestry, Providing forest welfare services and Creating a regional base in the forest sector, and Increasing incomes in the AG sector mainly fall into the KU area.

A total of 4 types fell under the CH area (Quadrant 2), which has high importance but low performance: FG1 and FC1 in the forestry sector; and AS5 and AS6 in the AG sector. The types corresponding to the CH area should be supplemented preferentially compared to other types because their performance may continue to decrease if they are not improved quickly. The types that fell into this quadrant were: Creating green infrastructure (FG1: Creating forests for environmental improvement) and Promoting forest culture tourism (FC1: Discovering forest cultural assets) in the forestry sector; and Improving settlement environment (AS5: Establishment of automation of agricultural infrastructure using ICT; AS6: Creation and supplementation of welfare/cultural facilities) in the AG sector.

A total of 17 types belonged to the LP area (Quadrant 3), which has both low importance and performance: FF4, FF6, FG3, FG5, FW5, FR3, FR4, FR5, FC3 in the forestry sector; and AS7, AI2, AI3, AI8, AC3, AC4, AC5, AC7 in the AG sector. Since the types corresponding to the LP area may be not important to policy stakeholders, it seems that they are far from the priority considerations. Many types of the following domains fell into this quadrant: Creating a regional base, Boosting forestry and Providing forest welfare service in the forestry sector; and Increasing incomes and Strengthening local capacity in the AG sector.

A total of 7 types fell under the PO area (Quadrant 4) with high performance compared to low importance: FF5, FG2, FG4, and FW2 in the forestry sector, and AS2, AS4, AS8 in the AG sector. The types that fall into PO are at a danger of overkill efforts: Creating green infrastructure

| Category | Forestry sector | Agriculture sector |
|----------|-----------------|--------------------|
| IPA      |                 |                    |
| Quadrant | N               | Type               | Type               |
| 1(KU)    | 22              | FF1, FF2, FF3, FG6, FW1, FW3, FW4, FW6, FR1, FR2, FR6, FC2 | AS1, AS3, AI1, AI4, AI5, AI6, AI7, AC1, AC2, AC6 |
| 2(CH)    | 4               | FG1, FC1           | AS5, AS6           |
| 3(LP)    | 17              | FF4, FF6, FG3, FG5, FW5, FR3, FR4, FR5, FC3 | AS7, AI2, AI3, AI8, AC3, AC4, AC5, AC7 |
| 4(PO)    | 7               | FF5, FG2, FG4, FW2 | AS2, AS4, AS8      |
| Total    | 50              |                    |                    |

Fig. 6. The results of IPA in forestry and AG sectors.
in the forestry sector, and Improving settlement environment in the AG sector.

Looking at the overall scatter diagram, it was found that 39 out of the total of 50 types were distributed in the KU and LP areas, forming a linear pattern. This seems to be a result of the limitation that the importance and performance in the IPA measurement cannot be evaluated independently, but mutually influence each other. Nevertheless, most of the projects that should be maintained continuously and require gradual improvement were found to be distributed in those areas, indicating that policy development is necessary for projects belonging to the CH area (Quadrant 2) that require intensive efforts in both forestry and agriculture.

In addition, while the types in the forestry sector are distributed in a narrow oval shape, those in the AG sector are widely distributed in a relatively wide oval shape. This indicates that while there are five domains in the forest sector, their types are more closely related between types than those of the three domains in the AG sector, and that the types corresponding to Quadrants 1 and 3 in the AG sector will be easily expanded to Quadrant 2.

Taken together, core projects focused on mountain village revitalization were insufficient in both the forestry and AG sectors, so it is necessary to develop them. It was found that the forestry sector needs to further improve the performance of projects related to "boosting forestry" and "discovering forest cultural assets," and also must review the wide scalability of project types in cooperation with the AG sector.

**Comparative analysis of importance and performance in the forestry and AG sectors**

Overall, comparing importance and performance, they were found to be 3.85 and 3.61, respectively, indicating that importance was higher than performance (Table 4). However, this was not a statistically significant finding. Comparing by sector, the importance of the forestry and AG sectors was 3.78 and 3.92, respectively, and the performance was 3.54 and 3.70, respectively, showing that both the importance and performance (significant at a level of $p < .05$) of the forestry sector were lower than those of the AG sector. This indicates that more attention should be paid to policy projects in the forestry sector, while in the AG sector, a project strategy needs to be established so that mountain villages are not excluded, and can benefit. Looking at each sector, the importance and performance of the forestry sector were 3.78 and 3.54, respectively, while those of the AG sector were 3.92 and 3.70, respectively, so in both sectors, importance was higher than performance, to a statistically significant extent at $p < .05$. This suggests that overall, the types of policy projects have a lower level of actual performance compared to their importance, and it is necessary to find types of projects that can improve performance.

**Comparative analysis of importance and performance by policy project type**

The results of a comparative analysis of the importance and performance for 8 domains using T-test is shown in Fig. 7.

Comparing the 8 domains, the domains whose importance was found to be relatively high compared to the overall average (3.85) include: Increasing incomes (3.95), Providing forest welfare service (3.94), Improving settlement environment (3.91), and Strengthening local capacity (3.90); while those whose importance was found to be relatively low

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**Table 4. T-test comparative analysis of the forestry and agriculture sectors**

| Category      | Importance (I) | Performance (P) | Gap (I-P) | t value |
|---------------|----------------|-----------------|-----------|---------|
| Forestry sector | 3.78           | 3.54            | 0.24      | 12.524*** |
| Agriculture sector | 3.92        | 3.70            | 0.22      | 7.916***  |
| Total         | 3.85           | 3.61            | 0.24      | 14.119*** |
| Gap (I-P)     | -0.14          | -0.16           | 0.02      |         |
| t value       | -1.628         | -1.950*         | 0.110     |         |

* $p < .05$, ** $p < .01$, *** $p < .001$
include: Boosting forestry (3.84), Creating green infrastructure (3.73), Promoting forest culture tourism (3.69), and Creating a regional base (3.68). In particular, the domains with the lowest importance in the forestry sector were Creating a regional base and Promoting forest culture tourism. Domains whose performance was relatively high compared to the overall average (3.62) were Improving settlement environment (3.78), Increasing incomes (3.75), Providing forest welfare service (3.72), and Boosting forestry (3.67); while those with relatively low performance were Strengthening local capacity (3.55), Creating green infrastructure (3.51), Creating a regional base (3.36), and Promoting forest culture tourism (3.36). Three domains had both high importance and high performance: Providing forest welfare service, Improving settlement environment, and Increasing income; while two had the lowest importance and performance: Creating a regional base and Promoting forest culture tourism. Analyzing each domain in detail (Table 5), 4 types belonging to the domains with both high importance and performance were found to have a statistically significant \((p < 0.5)\) relatively low performance compared to importance: "providing forest therapy service," "creating forest-related jobs," "creation and supplementation of welfare/cultural facilities," and "establishment of a sustainable agricultural foundation." On the other hand, for 4 types belonging to the domains with the lowest importance and performance ("supporting community revitalization", "urban-rural exchange", "establishing and boosting forest tourism", and "discovering forest cultural assets"), the importance was relatively higher than the average of 3.78 in the forest sector and the overall average of 3.85, and the performance was relatively low, a statistically significant finding \((p < 0.5)\). Therefore, it was found that a total of 8 types of projects need to be promoted through intensive efforts to improve performance.

**Discussion**

Through an analysis of policy projects that contribute to the revitalization of mountain villages by dividing them into forest and AG sector projects in terms of response to the crisis of local extinction and balanced national development, 50 types of policy projects derived from a total of 8 domains in both sectors were found to have direct and indirect effects: in the forestry sector, 27 types from 5 domains (Boosting forestry, Creating green infrastructure, Providing forest welfare service, Creating a regional base, and Promoting forest culture tourism); and in the AG sector, 23 types from 3 domains (Improving settlement environment, Increasing income, and Strengthening local capacity). By comprehensively examining the characteristics of these classification types, the following four implications can be derived.

First, based on an IPA of policy projects related to mountain village revitalization, 22 types out of 50 types were distributed in Quadrant 1, and 4 types were distributed in Quadrant 2. Among the types that fall into Quadrant 1,
Table 5. Paired t-test analysis of importance and performance in 50 types

| No. | Forestry sector                                                                 | Importance (I) | Performance (P) | Gap (I-P) | t value  |
|-----|--------------------------------------------------------------------------------|----------------|-----------------|-----------|----------|
| 1   | FF1 Supporting cultivation of professional forestry workers                     | 4.20           | 4.00            | 0.20      | 2.082*   |
| 2   | FF2 Creating a production base for forest products                             | 4.18           | 3.93            | 0.25      | 2.360**  |
| 3   | FF3 Strengthening competitiveness in clean forest products                      | 4.00           | 3.78            | 0.23      | 2.040**  |
| 4   | FF4 Local forestry cooperative-activation project                               | 3.80           | 3.45            | 0.35      | 1.183    |
| 5   | FF5 Backhoe-loader resident support project                                     | 3.45           | 3.05            | -0.40     | 0.621    |
| 6   | FF6 Nurturing the wood industry                                                | 3.58           | 3.28            | 0.30      | 2.440**  |
|     | Subtotal                                                                       | 3.84           | 3.67            |           |          |
| 7   | FG1 Creating forests for environmental improvement                             | 3.90           | 3.53            | 0.38      | 2.735**  |
| 8   | FG2 Creating green areas in living spaces                                       | 3.78           | 3.58            | 0.20      | 1.347    |
| 9   | FG3 Creating and managing street trees                                          | 3.50           | 3.30            | 0.20      | 1.749    |
| 10  | FG4 Creating dullegil (trails)                                                 | 3.78           | 3.58            | 0.20      | 2.082*   |
| 11  | FG5 Spreading and industrializing garden culture                                | 3.55           | 3.38            | 0.18      | 1.481    |
| 12  | FG6 Creating nice hiking trails                                                | 3.88           | 3.70            | 0.18      | 1.639    |
|     | Subtotal                                                                       | 3.70           | 3.47            |           |          |
| 13  | FW1 Creating and operating forest recreation facilities                          | 4.15           | 3.95            | 0.20      | 1.599    |
| 14  | FW2 Boosting forest leisure and sports                                          | 3.68           | 3.58            | 0.10      | 0.830    |
| 15  | FW3 Strengthening the base for forest education                                 | 3.83           | 3.60            | 0.23      | 2.040**  |
| 16  | FW4 Providing forest therapy service                                           | 4.05           | 3.78            | 0.28      | 2.177*   |
| 17  | FW5 Creating timber culture experience centers                                  | 3.48           | 3.30            | 0.18      | 1.740    |
| 18  | FW6 Creating forest-related jobs                                                | 4.45           | 4.10            | 0.35      | 2.560*   |
|     | Subtotal                                                                       | 3.70           | 3.47            |           |          |
| 19  | FR1 Supporting community revitalization                                         | 4.20           | 3.83            | 0.38      | 2.199*   |
| 20  | FR2 Establishing and boosting forest tourism                                    | 3.88           | 3.58            | 0.30      | 2.149*   |
| 21  | FR3 Income-based mountain village housing project                               | 3.73           | 3.40            | 0.33      | 2.481*   |
| 22  | FR4 Creating the base for development of the stone industry                     | 2.85           | 2.65            | 0.20      | 1.931    |
| 23  | FR5 Establishing an integrated joint mountain monitoring system                 | 3.43           | 3.08            | 0.35      | 2.563*   |
| 24  | FR6 Urban-rural exchange                                                        | 3.98           | 3.63            | 0.35      | 2.405*   |
|     | Subtotal                                                                       | 3.65           | 3.36            |           |          |
|     | Total                                                                           | 3.78           | 3.54            | 0.24      | 12.544***|

Table 5. Paired t-test analysis of importance and performance in 50 types

| No. | Agriculture sector                                                                 | Importance (I) | Performance (P) | Gap (I-P) | t value  |
|-----|--------------------------------------------------------------------------------|----------------|-----------------|-----------|----------|
| 1   | AS8 Reinforcement of policy support for farmers                                 | 4.03           | 3.87            | 0.16      | 0.628    |
| 2   | AS9 Establishment of a rural transportation model                              | 4.02           | 3.90            | 0.12      | 0.628    |
| 3   | AS5 Expansion of a rural SOC foundation                                        | 3.95           | 3.82            | 0.13      | 0.628    |
| 4   | AS4 Securing stable agricultural water                                         | 3.87           | 3.75            | 0.12      | 0.628    |
| 5   | AS5 Establishment of automation of agricultural infrastructure using ICT technology | 3.95           | 3.67            | 0.28      | 1.986    |
| 6   | AS6 Creation and supplementation of welfare cultural facilities                | 4.05           | 3.69            | 0.36      | 2.663*   |
| 7   | AS7 Establishment and supplementation of parks·sports facilities                | 3.62           | 3.62            | 0.00      | 0.000    |
| 8   | AS8 Establishment of a local characteristic village                            | 3.90           | 3.77            | 0.13      | 1.404    |
|     | Subtotal                                                                       | 3.91           | 3.78            |           |          |
| 9   | AI1 Vitalization of rural tourism                                              | 4.18           | 3.95            | 0.23      | 1.652    |
| 10  | AI2 Support for revitalization of rural study centers                           | 3.49           | 3.41            | 0.08      | 0.650    |
| 11  | AI3 Support for revitalizing social agriculture                                | 3.79           | 3.67            | 0.12      | 0.961    |
| 12  | AI4 Creation and supplementation of income infrastructure                      | 4.10           | 4.03            | 0.07      | 0.517    |
| 13  | AI5 Expansion of support for farming resettlement for returning farmers        | 4.10           | 3.85            | 0.25      | 1.761    |
| 14  | AI6 Designation of rural convergence industrial districts and support for revitalization of it | 3.95           | 3.74            | 0.21      | 1.538    |
| 15  | AI7 Establishment of a sustainable agricultural foundation                       | 4.15           | 3.72            | 0.43      | 2.859**  |
| 16  | AI8 Support for the landscape preservation direct payment system                | 3.87           | 3.62            | 0.25      | 1.819    |
|     | Subtotal                                                                       | 3.91           | 3.75            |           |          |
| 17  | AC1 Competency building education                                              | 4.05           | 3.72            | 0.33      | 1.821    |
| 18  | AC2 Development and operation of experience programs                            | 4.05           | 3.74            | 0.31      | 1.821    |
| 19  | AC3 Promote the designation of important agricultural heritage in the country world | 3.69           | 3.28            | 0.41      | 2.731**  |
| 20  | AC4 Projects of the Rural New Vitality Plus                                   | 3.87           | 3.49            | 0.38      | 2.837**  |
| 21  | AC5 Rural revitalization Support Center: Policy Support                        | 3.90           | 3.51            | 0.39      | 2.837**  |
| 22  | AC6 Rural revitalization Support Center: Human Resources Development            | 4.03           | 3.72            | 0.31      | 2.226*   |
| 23  | AC7 Rural revitalization Support Center: On-site farms operation support        | 3.74           | 3.38            | 0.36      | 2.407*   |
|     | Subtotal                                                                       | 3.90           | 3.55            |           |          |
|     | Total                                                                           | 3.92           | 3.70            | 0.22      | 7.916***|

* p < .05, ** p < .01, *** p < .001

Source: Kang et al.(2021)
"providing forest welfare service" in the forestry sector and "increasing incomes" in the AG sector are project domains that require continuous promotion to revitalize the mountain villages, so it is necessary to suggest a direction for the policy to be maintained. In particular, the intensive and core projects domains falling under Quadrant 2 included in the forestry sector, creating green infrastructure (FG1: creating forests for environmental improvement) and promoting forest culture tourism (FC1: discovering forest cultural assets); and in the AG sector, improving settlement environment (AS5: Establishment of automation of agricultural infrastructure using ICT technology), AS6: Creation and supplementation of welfare/cultural facilities). The 4 types require active promotion and improvement in terms of mountain village revitalization by increasing performance.

Second, many types of the "creating a regional base" domain in the forestry sector and the "strengthening local capacity" domain in the agricultural administration sector fall under Quadrant 3. The respondents considered that the current status should be maintained for the types for revitalization of the entire region. In addition, FF5, FG2, FG4, FW2, AS2, AS4, and AS8, which are in Quadrant 4, are at a risk of overkill efforts, and it is thus necessary to keep the projects at the current level so that the performance does not deteriorate, or to change the current projects in a new direction.

Third, the importance and performance of the forestry sector were generally lower than those of the AG sector, and the difference in performance was even greater. As this means that projects in the AG sector are considered to be directly important to the revitalization of mountain villages, it is important to establish a direction so that the projects in the AG Sector can be carried out in the mountain villages without being excluded. The domains with high importance and performance were found to be "providing forest welfare service" in the forestry sector, and "improving settlement environment" and "increasing incomes" in the AG sector. It is necessary to establish a direction to continuously and intensively promote for these three domain projects. In particular, the performance of the following four types was found to be low compared to the importance, indicating that a policy response to improve the performance was necessary: providing forest therapy service, creating forest-related jobs, creation and supplementation of welfare/cultural facilities, and establishment of a sustainable agricultural foundation.

Fourth, the domains with low importance-performance to mountain village revitalization were "creating a regional base" and "promoting forest culture tourism." However, the following four types of these domains were found to have low performance despite their very high importance: supporting community revitalization, boosting forest tourism, urban-rural exchange, and discovering forest cultural assets. They need to be discovered and fostered as key policy projects, and business diversification should be sought with a focus on these.

**Conclusion**

Summarizing the analysis results in this study, forest welfare service projects should continuously be promoted, and should also be shifted in a commercialized direction based on communities in mountainous areas. In addition, strategic responses are required for "discovering forest cultural assets" and "creating forests for environmental improvement," which are suggested as key strategic project types. To this end, such policy projects require a regionally tailored operation strategy that can discover forest cultural assets and link them with forest tourism and community revitalization. In addition to discovering forest cultural assets, strategic responses should be presented, in which they can be commercialized and used as a means of exchange between mountain villagers and city dwellers through publicity and marketing. Furthermore, as the domains and types in the AG sector currently being promoted have both high importance and performance to the revitalization of mountain villages, when discovering new key projects in the future, it seems necessary to apply the "business using ICT technology" and "welfare and cultural service facilities," which are core strategic projects that may have a direct impact on the mountain villages among the projects in the AG sector.

In response to one of the challenges of the times, the extinction of certain local communities, this study assessed the importance of policy projects in the field of forest welfare and culture in terms of revitalization of mountain vil-
lages for balanced regional development. It is considered that a research approach on how to link such importance with solving regional problems is necessary. It is understood that the discovery of regional forest policies linked with keywords such as forest welfare services, forest culture, and community will be key in the process. In addition, this study had a limitation in that the policy projects were concentrated in Quadrants 1 and 3 because a modified IPA model was not applied in the IPA analysis. In follow-up studies, it will be necessary to analyze the data by applying a modified IPA model.

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