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A Study on the Differences in the Recognition of a Geosciences and Mineral Resources Institution's Brand Factors between the Internal and External Public

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지질자원 기관 브랜드 요인에 대한 내외 공중 인식 차이 분석 연구

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본 연구는 지질자원연구원의 브랜드 요인에 대해 내부 공중과 외부 공중의 인식 차이를 살펴보는 것이다. 국가 발전에 기여하는 다양한 기관들 중 본 연구는 지질자원연구원을 중심으로 브랜드화 전략에 대해 고찰하였다. 이러한 분석을 통해 지질자원연구원뿐만 아니라 과학 관련 기관들의 브랜드화 전략에 전략적 시사점을 제공하고자 했다. 다양한 차원의 브랜드 요인에 대해 분석한 결과, 내부 공중인 전문가 집단과 외부 공중인 비전문가 집단 사이의 인식차이가 뚜렷하게 나타나고 있음을 알 수 있었다. 전반적으로 지질자원연구원의 브랜드화 전략에 영향을 미치는 다양한 변수들에 대한 반응에서 내부 공중이 외부 공중보다 좀 더 긍정적임을 알 수 있었다.

주요어 : 브랜드 요인, 과학커뮤니케이션, 지질자원연구원, 내부공중, 외부공중

This study investigates the differences in the recognition of the brand factors of the Korea Institute of Geoscience and Mineral Resources (KIGAM) between the internal and external public. This study considers KIGAM's brand strategy among the various institutions contributing to the country's development. Through the analysis, this study provides strategic implications about science-related institutions as well as KIGAM. According to the results of the brand factors in various dimensions, differences in the recognition between the internal and external public were found to be evident. The results reveal that the internal public shows more positive attitude than the external public on the variables that affect KIGAM's branding strategies.

Key words : brand factor, science communication, geosciences, mineral resources, internal public, external public

1. Introduction

Among the various organizations in society, enterprises seeking profit are devoting themselves to managing their brands. Viewing the process of their brand management, they usually look into the images consumers have of their companies and their brands, and establish a brand management strategy based on this material. In other words, enterprises know the fact that the image of their companies as appraised by consumers has a decisive effect on the success of the brand (Baldauf, *et al*., 2009). Not only are manufacturers and enterprises that produce and circulate goods

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managing their brands, but a number of countries are also engaging in various activities to enhance their positive images and reputations (Anholt, 2007).

Namely, we can say that national images and corporate images are in a relationship of interaction affecting each other. Of the components of the national industry, tourism can be cited as a strategic industry that contributes to national economic development and the formation of a national image (Seo & Jeong, 2005).

Active discussions have been held on the components and characteristics of corporate and policy brands. In particular, preparing a strategy way to improve a national brand and carrying it out are becoming the main points at issue under the situation, bringing the study of national brand as a main factor of national competitiveness into importance. According to the results of a survey of 1,000 foreigners in Korea on Korea's representative image carried out by the Presidential Council on Nation Branding, the participants picked long history and tradition (22.8%), food (17.9%), national character (11%), science and technology (10.6%), and educational level and desire for education (8.8%) as important fields that affect Korea's positive image. They also singled out information and communication (34.5%) and science technology (13%) (Munhwa Daily, 2009. 3. 17.).

In this situation, branding in the science and technology field, which enhances Korea's indigenous brand value, will become an important national brand strategy, and the importance of the science and technology brand has been stressed. As the necessity for and importance of science and technology communication are increasing, the demand for science and technology branding is becoming greater. Nevertheless, studies on the various dimensions of branding in the science and technology field have not been done yet. Although diverse studies on brands in the commercial and national arenas have been done, discussions on branding in the science and technology field have not been done. Accordingly, this study hopes to offer discussion about branding in the science and technology field, which contributes to building the national brand. This study contemplated the branding strategy of the Korea Institute of Geoscience and Mineral Resources (KIGAM), which plays an important role in offering public service among many domestic science institutions. This study looked into branding centering on the differences of recognition between KIGAM's inside public and the external public. Through this analysis, we hope to offer strategic indications about the brand strategy of various science-related institutions that contribute to national development, including KIGAM.

2. Theoretical Background

2.1. Brand Management

Brand has been recognized as an object that various organizations have interest in and manage. Brand refers to an experimental symbolic system that identifies a company's products and services, distinguishes competitors' products and services, and makes consumers have value creating feeling. Brand is a concept that is not limited to a verbal or visual emblem as a simple component of a product. It has a comprehensive value, such as a differentiated feeling of satisfaction and a sense of superiority that consumers feel when they select the product, in addition to high-level functionality and polished design. If we look into the definition of brand more concretely, we can discuss it from the positions of a producer and a consumer. Among the definitions from the producer's position, the American Marketing Association (AMA) defines brand as the "name, term, sign, symbol, design or composition that a seller differentiates his or her products and services from other competitors' products and services" (Choi & Kim, 2005).

This definition has two characteristics. First, brand includes expression, symbol, and design, not to mention a brand name. Second, brand is a means that a specific company uses to give its customers a clear recognition of its products or services, while differentiating their products and services from those of its competitors. In other words, brand is the core way that a company uses to differentiate its own products from other competing goods (Shin, Kang, & Kim, 2003).

From the consumer's position, brand can be understood as a means to recognize products, which expresses the company's image through it (Shin, Kang, & Kim, 2003). A brand is a tool that consumers use to appraise tangible or intangible products and services. Rather than analyzing all the concrete characteristics of products and making

a decision to purchase, consumers tend to enhance the efficiency of their purchase decision and express consumer's image through the brand simultaneously by remembering a satisfactory brand and purchasing it later.

Brand has been recognized as a purpose of an organization's management, becoming recognized as the most important 'equity' of a company. From this viewpoint, the goal of various types of organizational activity has been set to enhance organizational value by improving brand value. The main business of brand managers at an organization can be cited as brand management to maximize brand assets by having customers recognize the functionality, efficiency, or value of the brand (Biehal & Sheinin, 1998). According to David Ogilvy, who defined brand assets, brand assets are understood as the thoughts or appraisal that the public has about a product. Accordingly, the value of a brand is appraised by the public and it can be regarded as the core of the brand's assets (Blackston, 2000). Keller (1993) places the focus on the explanation of brand recognition and brand image among the ways to have knowledge about the brand. It is based on the public's efforts to differentiate brands. It plays a role in confirming how well the public derives a brand from memory and how the brand identities set by the organization carry out their functions. Such brand recognition consists of brand re-recognition and brand reminiscence. Brand re-recognition refers to the public's ability to confirm that they were exposed to the brand before when a clue about the brand is suggested to them. Brand reminiscence means the public's ability to extract a brand from memory precisely.

Measuring people's attitudes about a public-centered brand contributes to the formation of the brand's assets. In particular, if we consider brand assets from the brand management side, asset measurement of the public is necessary among the various brand asset component factors (Song, 2006). According to Percy, Rossiter, and Elliott (2002), a positive attitude toward a brand leads to a positive brand asset among the various factors building brand assets. Aaker also found a typical relationship between brand attitude and brand assets after studying the relationship between the two. Accordingly, one of the methods for measuring brand assets is to measure people's attitudes toward brand (Moon & Hong, 2007).

Faquhar (1989), who looked into brand assets from the viewpoint of the public, said that brand asset value can be changed according to the public's attitudes toward the brand. To actually find out the brand results, he suggested that it is necessary to look into the public's attitudes about brand in general.

2.2. The science and Technology Brand

Before discussing the science and technology brand, it is necessary to define the concept first, because it is a relatively unfamiliar concept to us. As we discussed above, the method for establishing the status of the science and technology brand in people's recognition system can be one of product, service, person, thing, idea, process, organization, and country.

To look into the discussions about the science and technology brand that have occurred so far, a keyword search was carried out at the National Assembly Library in Korea. Only one case was found after searching with the keywords 'science and technology brand'. This result concerned the government's science and technology policy brand. After searching with the keywords 'science brand', two books were found, eleven degree theses, four academic journals, and two Internet sources.

In the case of the degree theses, the general brand study results were checked, regardless of science and technology. They had no significant relationship with the science and technology brand. The two Internet sources dealt with press reports released by science-related institutions. The two books handled subjects closely related to the science and technology brand. After viewing these results, we found that there were no materials related to the science and technology brand.

If we apply the frame of brand as an enterprise, individual, region, policy, and idea to the science and technology field in the discussions about types of brand (objects) mentioned above, we can classify them into corporate brand in the science and technology field (product brand), an individual as science and technology brand, a representative institution brand in the science and technology field, brand as a science and technology policy, city brand in the science and technology field, and science and technology field as an idea.

3. Research Questions

This study investigated KIGAM from the brand management side. We looked into the recognition of the institution, understanding, attitude, the process of creating factors that promote or hampe brand, and their differences by dividing KIGAM's external and internal public. The research questions established in this study are as follows.

<RQ 1> What is the external public's recognition and understanding of KIGAM?

<RQ 2> Are there any differences in the attitudes toward KIGAM between the external public and internal public?

<RQ 2-1> Is there any difference in the recognition of KIGAM between the external public and the internal public?

<RQ 2-2> Is there any difference in people's confidence in KIGAM between the external public and the internal public?

<RQ 2-3> Is there any difference in the appraisal of KIGAM's efforts to recover from blunders between the external public and internal public?

<RQ 2-4> Is there any difference in the appraisal of KIGAM's contributions to the nation between the external public and the internal public?

<RQ 3> Is there any difference in KIGAM's image between the external public and the internal public?

<RQ 4> Are there any differences in the factors that promote or hamper KIGAM's brand between the external public and the internal public?

4. Method

4.1. Data Collection

To analyze the brand factors based on the recognition of KIGAM by the internal and external public, a survey that divided the internal constituents and the external public was carried out. To draw up the questionnaire about KIGAM, the researchers developed a measurement yardstick based on the methods, appraisal items, and relevant literature and materials in Korea and abroad first. Then they considered whether or not such items were suitable for measuring the degree of the recognition of the brand and the research outcomes.

The survey was carried out for 20 days in Seoul, Gwacheon, Cheongju, and Daejeon by dividing the general citizens and KIGAM staff members. The survey of the external public was carried out with 310 adults residing in the metropolitan area of Seoul and Chungcheong region. Meanwhile, the survey of the internal public was conducted with the staff members at KIGAM.

For the survey of the external public, we employed this study's research assistants, students at the Department of Advertising and Public Relations of Cheongju University, and housewives as interviewers. After receiving enough education on the purpose, method, and contents of the research, they were dispatched to the places to carry out the survey.

4.2. Measurement of the Dependent Variable

The questionnaire was administered to the respondents through the self-reported method and the approval of each item was measured with a 5-point scale. The question on brand image was designed as an open-ended type to help the respondents describe their thoughts freely.

Various types of questions were designed to inquire into the research questions set by this study. First, the external public's degree of recognition and understanding of KIGAM was measured. Questions about how much the respondents knew and understood about KIGAM were asked. Then, we measured the degree of recognition of KIGAM that the internal and external public had regarding quality recognition, rationality, and sensitivity, looking into the difference between the internal and external public. And we measured confidence in KIGAM in terms of its efforts to recover from failure, and its attitude toward its contributions to national development, looking into the difference between the internal and external public. The measurements of the dimension of attitude were carried out by using a 7-point Likert scale.

Also, the image of KIGAM held by the external and internal public was measured, and we looked into the difference between them. In the measurement of image, we requested that the respondents describe the image they associate with KIGAM freely. An analysis of the content centering on the words that appeared commonly among the respondents was

carried out.

Finally, we cast questions on the factors that promote or hamper KIGAM's brand. We requested that the respondents select promoting and hampering factors among a total of 12 brand-related factors.

The 12 factors were classified into human factors, technological factors, internal factors, and external factors. The brand-related factors and classification frame can be arranged as shown in <Table 1> and <Table 2>.

5. Results

5.1. Results of RQ 1: The External Public's Degree of Recognition and Understanding of KIGAM

RQ 1 asked how much the external public recognizes and understands KIGAM. First, according to the results of measuring the degree of recognition of KIGAM, 37% replied that they did not have the least idea about KIGAM and 45% said they did not know on the question, "I know KIGAM very well." This indicates that 82% of the total respondents did not know about KIGAM in general. On the other hand, 18.7% of the respondents said they knew about KIGAM, including 17.8% who said "medium." This result is statistically significant (χ^2=255.036, df=4, p<0.001).

Such results indicate that the general citizens residing in the metropolitan and Chungcheong area do not recognize KIGAM in general. Two reasons can be inferred. The first reason is that many of KIGAM's research outcomes did not spread to the public. The second reason is that there are no connection points between KIGAM's activities and the geoscience and mineral resources-related messages recognized by general citizens. Accordingly, PR activities that enhance the meaning of KIGAM's existence need to be carried out more actively. In particular, activities that strengthen the linkage between geoscience and mineral resources-related messages recognized by general citizens and KIGAM's research outcomes are required <Table 3>.

Also, the external public's degree of understanding of KIGAM was measured. On the question, "I understand KIGAM very well," 33.8% replied that they do not understand totally and 44.2% said that they do not understand KIGAM. This means that 79% of the total respondents do not understand KIGAM. On the other hand, 21.9% of the respondents said they understand more than the normal level. To find out if the differences between the answers deserve attention statistically, an χ^2 an alysis was carried out. This results statistically significant (χ^2=118.550, df=3, p<0.001).

Such results indicate that the general citizens' degree of understanding of KIGAM is not very good. This is largely ascribable to the fact that the research institution tends to depend on attributes, and KIGAM's business content has not been

Table 1. Brand factors of Korea Institute of Geoscience and Mineral Resources(KIGAM)

① specialities and external activities of research staffs
② external specialist group
③ pride and communication abilities of research staffs
④ interest and criticism media and policy-makers
⑤ management of CEO
⑥ insincerity of the executives of related companies
⑦ excellence and originality of research output and outcome
⑧ overseas technology utilized by international cooperation
⑨ excellence of research equipment and facilities
⑩ industrial needs on research output and outcome
⑪ research management system
⑫ needs of research output and outcome in national security

Table 2. Classification for analysis on brand factors

Classification	Internal	External
Human factors	-specialities and external activities of research staffs -pride and communication abilities of research staffs -management of CEO	-external specialist group -interest and criticism media and -policy-makers -insincerity of the executives of related companies
Technological factors	-excellence and originality of research output and outcome -excellence of research equipment and facilities -research management system	-overseas technology utilized by international cooperation -industrial needs on research output and outcome -needs of research output and outcome in national security

Table 3. Questionnaire about brand recognition in the Korea Institute of Geoscience and Mineral Resources(KIGAM)

Classification	Frequency	Percentage (%)
I know nothing whatever about the KIGAM.	112	37.0
I don't know the KIGAM very well.	138	45.0
It is an uninteresting question.	54	17.8
I know a little bit about the KIGAM.	2	0.1
I know very well about the KIGAM.	1	0.0
Missing value	3	0.1
Total	310	100.0

popularized. To enhance the citizens' degree of understanding of KIGAM, accordingly, : KIGAM should seek ways of making contact with citizens with messages feeling citizens' lives, along with improving the degree of recognition <Table 4>.

5.2. Results of RQ 2: Difference in the Attitude toward KIGAM between the External Public and Internal Public

5.2.1. Difference in the recognition of KIGAM between the external public and internal public

The RQ 2-1 set in this study looks into the difference in the attitude toward KIGAM between the external and internal public. First of all, we looked into the difference from the quality recognition aspect of KIGAM. On the question to the external public, "KIGAM has excellent quality," 9.7% replied "not excellent at all"; 14.2%, "not so excellent"; 59.1%, "normal"; and 13.1%, "excellent." To find out if such response ratios deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=211.897, df=3, p<0.001).

Second, we measured the quality recognition of KIGAM through the survey of the internal public. According to the survey results on the superiority of KIGAM's quality, 59.7% said "good"; 31.2%, "fair"; 5.2%, "very good"; and 3.9%, "not very good." On the quality recognition of KIGAM, 64.9% of the internal public gave a positive answer, but 3.9% responded with a negative one, showing that the internal public has high pride in terms of quality recognition. This result is statistically significant (χ^2=64.143, df=3, p<0.001).

In analyzing the ratios by standard, the external public appraised KIGAM's quality recognition as lower than normal, but the internal public appraised it as higher than normal. To find out if such differences of recognition between the internal public and external public deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=96.653, df=4, p<0.001) <Table 5>.

Third, we looked into the recognition of KIGAM's rationality. We examined the responses of the external public on the question about the rationality of KIGAM. According to the analysis results on the question, 62% replied "fair"; 14.2%, "rational"; 12.6%, "not so rational"; and 7.7%, "not rational totally." To find out if such differences of the recognition of rationality by the external public deserve attention statistically, χ^2 analysis was carried out. This result is statistically significant (χ^2=248.117,df=3,p<0.001).

On the recognition of rationality in KIGAM, the internal public said that KIGAM was "rational" and 1.3% replied "very rational," showing that 44.2% of the total gave positive answers, higher

Table 4. Questionnaire about interest in the Korea Institute of Geoscience and Mineral Resources(KIGAM)

Classification	Frequency	Percentage (%)
I know nothing whatever about the KIGAM.	104	33.8
I don't know the KIGAM very well.	136	44.2
It is an uninteresting question.	57	18.6
I know a little bit about the KIGAM.	10	3.3
I know very well about the KIGAM.	-	0.0
Missing value	3	0.1
Total	310	100.0

Table 5. Questionnaire about recognition of outcome quality in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Very poor	30	9.7	0	0
Poor	44	14.2	3	3.9
Fair	183	59.1	24	31.2
Good	40	13.1	46	59.7
Very good	1	0.0	4	5.2
Missing value	12	3.9	0	0
Total	310	100.0	77	100.0

than the 7.8% who gave negative answers. This result is statistically significant (χ^2=52.160, df=3, p<0.001). This result shows that the internal public judges that KIGAM has been operating rationally. It can also be regarded as a positive factor of internal public's immersion into research activities and contribution to the organization.

Viewing the difference in the recognition of KIGAM's rationality between the internal and external public, the external public in general appraised lower than normal, but the internal public appraised higher than normal. To find out if such differences deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=37.780, df=3, p<0.001) <Table 6>.

Fourth, we measured the recognition of kindness in KIGAM by the external and internal public. On the question, "I feels kindly toward KIGAM," 37.7% of the respondents said "agree"; 28.9%, "disagree"; 20.8%, "strongly disagree"; and 9%, "neither agree nor disagree." To find out if such differences in the recognition of kindness deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=140.147, df=4, p<0.001).

On the other hand, according to the survey results of the internal public, 45.5% replied, "agree"; 39%, "neither agree nor disagree"; 13%, "strongly agree"; and 2.6%, "disagree." On the whole, 58.5% of KIGAM's internal public recognized kindness positively and just 2.6% gave a negative response, showing that more than half of the internal public recognize KIGAM affectionately. To find out if such differences in recognition by the internal public deserve attention statistically, we carried out an χ^2 analysis. This result is statistically significant (χ^2=38.792, df=4, p<0.001).

Viewing the recognition of kindness in KIGAM, we discovered differences between the internal and external public. Namely, the external public had more negative recognition of kindness than the internal public. To find out if such differences deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=111.867, df=4, p<0.001) <Table 7>.

Finally, we measured the recognition of warm-heartedness in KIGAM as established in this study. First of all, on the question, "How warmly I feel

Table 6. Questionnaire about recognition of rationality in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Very poor	24	7.7	0	0
Poor	39	12.6	6	7.8
Fair	192	62.0	37	48.1
Good	44	14.2	33	42.9
Very good	0	0.0	1	1.3
Missing value	11	3.5	0	0
Total	310	100.0	77	100.0

Table 7. Questionnaire about recognition of kindness in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	64	20.8	0	0
Disagree	89	28.9	2	2.6
Neither agree nor disagree	116	37.7	30	39.0
Agree	28	9.0	35	45.5
Strongly agree	2	0.1	10	13.0
Missing value	11	3.5	0	0
Total	310	100.0	77	100.0

about KIGAM," 38.7% replied, "neither agree nor disagree"; 29%, "disagree"; 20.3%, "strongly disagree"; and 8.1%, "agree"; according to the survey results of the external public. This result is statistically significant (χ^2=149.216, df=4, p<0.001).

On the other hand, on the question of the recognition of warm-heartedness, 46.8% replied, "agree"; 40.3%, "neither agree nor disagree"; 7.8%, "strongly agree"; and 5.2%, "disagree"; according to the survey results of the internal public. According to the survey results, 54.6% gave a positive response on the question about the recognition of warm-heartedness and 5.2% responded with a negative answer, showing that most of the internal public have a warm image of KIGAM. This result is statistically significant (χ^2=42.948, df=3, p<0.001).

Differences in the recognition of warm-heartedness in KIGAM appeared between the internal and external public. It was revealed that the internal public recognized more warmness about KIGAM than the external public. To find out if such differences deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=99.225, df=4, p<0.001) <Table 8>.

5.2.2. The difference in confidence in KIGAM between the external and internal public

We measured confidence in KIGAM in addition to the measurement of recognition in order to measure the public's attitude toward KIGAM. The measurement was carried out after classifying confidence into general confidence and confidence in KIGAM's research outcomes.

First of all, the general confidence held by the external public was measured. On the question, "I have general confidence in KIGAM," 50% replied "neither agree nor disagree"; 24.8%, "agree"; 13.9%, "disagree"; 7.1%, "strongly disagree"; and 2%, "strongly agree." This result is statistically significant (χ^2=230.383, df=4, p<0.001). On the other hand, on the same question, 57.1% replied "agree"; 28.6%, "neither agreen or disagree"; 10.4%, "strongly agree"; and 3.9%, "disagree"; according to the survey results of the general confidence held by theinternal public. This result is statistically significant (χ^2=52.506, df=3, p<0.001).

Differences in the measurement of general confidence in KIGAM appeared between the internal and external public. It was revealed that the internal public had higher general confidence

Table 8. Questionnaire about recognition of heartedness in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	63	20.3	0	0
Disagree	90	29.0	4	5.2
Neither agree nor disagree	120	38.7	31	40.3
Agree	25	8.1	36	46.8
Strongly agree	3	1.0	6	7.8
Missing value	9	2.9	0	0
Total	310	100.0	77	100.0

Table 9. Questionnaire about general confidence in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	22	7.1	0	0
Disagree	43	13.9	3	3.9
Neither agree nor disagree	155	50.0	22	28.6
Agree	77	24.8	44	57.1
Strongly agree	6	2.0	8	10.4
Missing value	7	2.2	0	0
Total	310	100.0	77	100.0

than the external public. This result is statistically significant (χ^2=48.888, df=4, p<0.001) <Table 9>.

In addition to general confidence, we measured confidence in KIGAM's research outcomes. First of all, we measured the external public's confidence. On the question, "I have confidence in the past, present, and future research outcomes of KIGAM (promotion of state science and technology power, contribution to geological industry, etc.)," 49.4% replied "neither agree nor disagree"; 27.4%, "agree"; 12.6%, "disagree"; 5.5%, "strongly disagree"; and 3.2%, "strongly agree." This result is statistically significant (χ^2=231.263, df=4, p<0.001).

According to the survey results of the confidence in KIGAM's research outcomes held by the internal public, on the same question, 58.4% replied "agree"; 26%, "neither agree nor disagree"; 11.7%, "strongly agree"; and 3.9%, "disagree." A positive response was 70.1% and 3.9% responded with a negative answer, showing that the internal public has high confidence in KIGAM's research outcomes. This result is statistically significant (χ^2=53.649, df=3, p<0.001).

According to the results of the comparative analysis of confidence in KIGAM's research outcomes after dividing the internal and external public, it was revealed that the internal public had higher confidence in KIGAM's research outcomes than the external public. This result is statistically significant (χ^2=42.199, df=4, p<0.001) <Table 10>.

5.2.3. Recognition of KIGAM's failure and recovery efforts between the external and internal public

We looked into the recognition of KIGAM's failure and recovery efforts after dividing the external and internal public to analyze the attitude toward KIGAM for RQ 2.

First of all, a survey of the external public on KIGAM's failure and recovery efforts was carried out. According to the analysis results, on the question, "If KIGAM makes a blunder, it will make best efforts to recover from the failure," 51.6% replied "neither agree nor disagree"; 26.8%, "agree"; 11.6%, "disagree"; 6.5%, "strongly disagree"; and 1.9%, "strongly agree." This result shows that the respondents tend to understand KIGAM positively rather than negatively, even if KIGAM makes a failure. This result is statistically significant (χ^2=256.000, df=4, p<0.001).

Table 10. Questionnaire about confidence of research outcome in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	17	5.5	0	0
Disagree	39	12.6	3	3.9
Neither agree nor disagree	153	49.4	20	26.0
Agree	85	27.4	45	58.4
Strongly agree	10	3.2	9	11.7
Missing value	6	1.9	0	0
Total	310	100.0	77	100.0

Table 11. Recognition about failure and recovery efforts of the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	20	6.5	0	0
Disagree	36	11.6	4	5.2
Neither agree nor disagree	160	51.6	9	11.7
Agree	83	26.8	50	64.9
Strongly agree	6	1.9	14	18.2
Missing value	5	1.6	0	0
Total	310	100.0	77	100.0

We also surveyed the internal public on KIGAM's failure and recovery efforts. On the same question, 53.2% replied "agree"; 29.9%, "neither agree nor disagree"; 15.6%, "strongly agree"; and 1.3%, "disagree." A positive answer was 83.2%, indicating that they have a positive stance about KIGAM"s efforts to do so if it faces such a situation. This result is statistically significant (χ^2=62.026, df=3, p<0.001).

According to the survey results on KIGAM's attitude to make efforts to recover from failure after dividing the internal and external public, it was revealed that the internal public had more positive thoughts than the external public. This result is statistically significant (χ^2=90.608, df=4, p<0.001) <Table 11>.

5.2.4. Recognition of KIGAM's national contribution between the external and internal public

We measured the recognition of KIGAM's national contribution to measure the participants' attitudes toward KIGAM set in this study. First of all, we surveyed the external public on their recognition of KIGAM's national contribution. On the question, "If KIGAM disappoints me once or twice, I still think KIGAM can contribute to the country," 43.9% replied "neither agree nor disagree"; 27.4%, "agree"; 17.4%, "disagree"; 6.8%, "strongly disagree"; and 3.2%, "strongly agree." This result showed that 31.6% recognized KIGAM"s contribution to the country positively and 24.2% responded with a negative answer. This result is statistically significant (χ^2=241.451, df=4, p<0.001).

We also surveyed the internal public on KIGAM's contribution to the country. On the same question, 59.2% replied "agree"; 25%, "strongly agree"; 13.2%, "neither agree nor disagree"; and 2.6%, "disagree." According to the survey results, 84.2% responded with a positive answer. In particular, 25% replied "strongly agree." Accordingly, it could be interpreted that an absolute majority of the internal public think KIGAM carries out its role of national contribution with pride. This result is statistically significant (χ^2=55.053, df=3, p<0.001).

According to the survey results on the recognition of KIGAM's national contribution between the internal and external public, it was revealed that the internal public had more positive thoughts about the recognition of KIGAM's national contribution than the external public. To find out if such

Table 12. Questionnaire about national contribution in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

Classification	External Public		Internal Public	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Strongly disagree	21	6.8	0	0
Disagree	54	17.4	2	2.6
Neither agree nor disagree	136	43.9	10	13.0
Agree	85	27.4	45	58.4
Strongly agree	10	3.2	19	24.7
Missing value	4	1.3	1	1.3
Total	310	100.0	77	100.0

differences deserve attention statistically, an χ^2 analysis was carried out. This result is statistically significant (χ^2=85.448, df=4, p<0.001) <Table 12>.

5.3. Results of RQ 3: Analysis of Differences of KIGAM's Image of between the External and Internal Public

In the RQ 3 established in this study, we looked into the differences of KIGAM's image between the external and internal public. The words "KIGAM," "geoscience," and "mineral resources technology" were suggested to the respondents and they were requested to write freely about the image, feelings, or anything else they could think of.

The results of the answers, which were derived through an open-ended type of question after dividing the external and internal public, are shown in <Table 13>.

Viewing the results, we can grasp what identities the respondents have for KIGAM. When analyzing the descriptive contents of the respondents, they can be divided into four types of identities: something related nature, energy, and emotion.

From the dimension of nature identity, the suggested words reminded the respondents of such words as "earth geology and soil," "rock, fossil," "dinosaur," "sun, climate, nature, earthquake," and "oxygen and environment." In the case of the internal public, such content as "geology, earth and soil," "earth, natural environment and the interior of the earth," "rock and fossil," "earthquake," and "water and ground water," appeared. Second, energy identity refers to uniting KIGAM as energy. The external public responded with "energy, new energy and renewable energy," and "underground resources, natural resources, mineral resources, ocean resources, oil, etc." On the other hand, the internal public described "underground resources, mine, metal mineral, oil, gas, and energy resources." Third, from the dimension of activity identity, it unites KIGAM centering on activity. It reminded the external public of such words as "research institute, national institute, and national key industry," "geological research, resources exploration, resources R&D, underground resources research, and mineral development," "marine exploration, marine resources development," and "Antarctic exploration." On the other hand, it reminded the internal public of such words as "museum, geological museum, research institute and national institute," "resources exploration, geological survey, underground resources development, and oil drilling," "nuclear, nuclear surveillance, and North Korea nuclear test detection," and "map and geological map." Fourth, emotion

Table 13. Questionnaire about recognition of image and appearance in the Korea Institute of Geoscience and Mineral Resources (KIGAM) between internal and external public

External	Internal
- Earth, Geology, Soil	- Earth, Geology, Soil
- Energy, New energy, Renewable energy	- Earth, Natural environment, Interior
- Earth science, Domestic geography	- Underground resources, Mine, Metal mineral, Oil, Natural gas
- Underground resources, Natural resources	- Museum, Research Institute
- Mineral resources, Ocean reources, Oil, Natural gas	- Resources exploration, Geological survey, Underground resources development, oil drilling
- Research institute, National institute, National key industry	- Rock, Fossil
- Geological research, Resources exploration Resources R&D, Underground resources research, Mineral development	- Nuclear, North Korea Nuclear
- Rock, Fossil	- Conservative
- Jurassic park, Dinosaur	- Earthquake
- Dry and boring, unfamiliarity	- Map, Geological map
- Sun, Climate, Nature, Earthquake	- Water, Ground water
- Environment, Green growth, Oxygen	- Miner, Road, Factory
- Groundwater, Marine exploration, Marine resources development	
- Antarctic exploration	

identity refers to general feeling of KIGAM. It reminded the external public of "dry and boring and unfamiliar," and it reminded the internal public of "dry and boring, simple honesty, lack of communication, outdated, time-worn, obsolete, slow, and conservative."

Viewing such research results, the image or something that the external public has about KIGAM has affirmative concepts from the nature, energy, and institutional activity sides, but has negativity from emotion. This means that a foundation has been created to strengthen KIGAM's status as an institution pursuing reasonable and rational nature and energy. On the other hand, it can be interpreted that the national friendly recognized foundation from the public side has vulnerable points.

Meanwhile, the internal public has positive thoughts about their institution and activities. From the emotional identity side, however, most of them have negative thoughts.

It can be interpreted that they have affirmative thoughts about their institution from the rational dimension, but they feel negative thoughts from the emotional dimension. Accordingly, communication activity to narrow the gap between the two sides is required during the process of establishing KIGAM's brand.

5.4. Results of RQ 4: Analysis of Factors that Promote or Hamper the KIGAM Brand between the External and Internal Public

The RQ 4 established in this study looked into the differences in recognition between the external and internal public on the factors that promote or hamper the KIGAM brand. According to the analysis results for the external public, they selected "professionalism and the external activities of the research manpower" as the most important factor of promoting the KIGAM brand, followed by "superiority and identity of research achievements." Viewing the respondents' content based on the above-mentioned four groups, the internal-human factor accounted for the biggest portion with 33%, followed by the internal-technical factor with 31%, external-technical factor with 23%, and external-human factor with 13%. Of the factors that promote the KIGAM brand, the respondents basically recognized internal factors as more important than external factors. For the internal factors, they thought that human factors and technical factors are important at almost the same level. The external-technical factor and external-human factor accounted for 23% and 13%, respectively, showing that the respondents recognize technical factors as more important in the external factors.

On the other hand, according to the survey results of the internal public, 49% of the respondents singled out "professionalism and the external activities of the research manpower" as the most important factor for improving and accelerating the KIGAM brand and 42% selected "superiority and identity of research achievements." Viewing the respondents' content based on the above-mentioned four groups, the internal-human factor accounted for the biggest portion with 45%, followed by the internal-technical factor with 32%, external-technical factor with 20%, and external-human factor with 3%.

On the factors that promote the KIGAM brand, the respondents basically recognized internal factors as more important than external factors. Of the internal factors, they thought that human factors are more important than technical factors. Such results indicate that the will of the internal public is that human factors should be strengthened in the internal factors to improve the KIGAM brand. The external-technical factors and external-human factors accounted for 20% and 3%, respectively. This reflects the opinion of the internal public, who regard technical factors as more important than human factors among the internal factors.

Of the factors that promote the KIGAM brand, it was found that both the external and internal public recognize internal factors as more important than external factors. In particular, they selected internal human factors as the most important one. On the recognition of external human factors, however, it was found that the external public regarded them as much more important compared with the internal public. On the recognition of technical factors, both the internal and external public had a similar view.

In this study, we also looked into the factors that hamper the KIGAM brand by dividing the external and internal public. According to the research results of the external public, the respondents cited

indifference and criticism of the media and policy makers as the biggest factor hampering the KIGAM brand, followed by the insincerity of the executives and staff of the relevant companies. Viewing the respondents' content based on the above-mentioned four groups, the external-human factor accounted for the biggest portion with 57%, followed by the internal-human factor with 19%, external-technical factor with 13%, and internal-technical factor with 11%. Of the factors that hamper the KIGAM brand, the respondents basically understood that external factors accounted for 70%. Of the external factors, they found that external-human factors accounted for 57%.

At the same time, a survey of the internal public was carried out. According to the analysis results, the internal public selected three factors as important in interrupting or hampering the KIGAM brand:- pride and the communication ability of the research manpower (27%), indifference and criticism of the media and policy makers (26%), and demands for research results by companies (23%).

Viewing the respondents' content based on the above-mentioned four groups, the internal-human factor accounted for the biggest portion with 32%, followed by the external-human factor with 30%, internal-technical factor with 20%, and external-technical factor with 18%. Of the factors that hamper the KIGAM brand, we found that the respondents basically understand that the human factor is more important than the technical factor, regardless of whether they are internal or external public. Such results show that KIGAM's internal staff recognize that the human factor greatly affects the improvement or hindrance of a brand. To enhance KIGAM's brand value, accordingly, the persistent and systematic management of the human factor is necessary.

Differences between the external and internal public appeared on the factors hampering the KIGAM brand. The external public recognized that the external factor, especially, the external human factor, is a problem, whereas the internal public showed self-introspection by seeking factors that hamper brand from inside. In particular, large differences between the external and internal public appeared in the external human factor. It was shown that the general citizens recognized the external human factor as 27% higher and important.

6. Discussion

The differences between the internal and external public on the recognition of KIGAM brand factors have been examined. This study focused on KIGAM's brand strategy contributing to national development. This analysis offers strategic indications for the brand strategy of science-related institutions.

When looking into the overall analysis results and the analysis results of the various brand factors, recognition differences appeared clearly between the internal public experts' group and the external public non-experts' group. Generally, we now know that the internal public was more affirmative than the external public on the responses to many variables affecting KIGAM's brand strategy.

Viewing the study results, about half of the respondents did not feel warm-heartedness toward KIGAM. Overall, the level of closeness toward KIGAM held by general citizens was low. This could be mainly attributable to the intrinsic factor possessed by research institutions. Another reason seems to be a fragile connection that links the various business content and KIGAM's study results with people's daily lives directly.

Based on the study results, we know that the general public's confidence in KIGAM is high. In other words, we can surmise that the general public has trust in KIGAM's role. However, we also know that there are large differences between the general public and the internal public on the degree of recognition, understanding, and intimacy. On the recognition of KIGAM's rationality, the general citizens show a neutral tendency. This seems to reflect the neutral attribute possessed by the state-run research institution. To receive people's interest and support, accordingly, KIGAM needs to engage in managerial activities that are differentiated from other state-invested research institutions. For instance, it needs to exert effort to produce opportunities for general citizens to have easy access to messages about KIGAM's innovative and rational managerial activities.

Overall, we found that KIGAM's brand strategy and management should be carried out in a more aggressive manner. In particular, KIGAM's brand identity strategy should be more established. To strengthen KIGAM's brand identity, KIGAM needs to develop a human-centered core message

that easily reminds people of geological resource technologies, and it needs to bolster communication. The present message, "KIGAM leading geological research and resources studies," is a message with substantive character focused on the institution's character. This substantive message has the merit of representing the institution's character of existence, but has a weak point in failing to show the institution's benefits to the people. As a result, it is necessary to develop a beneficial message about KIGAM's brand that stresses this point. For brand management, KIGAM needs to strengthen its realistic internal system more. For example, KIGAM needs to consider establishing a brand management committee in which KIGAM's key managers would participate, in order to encourage institutional activities, including the spread of the results of the study of geo-technology and the acceleration of marketing activity. As seen in the above factors that accelerate or hamper KIGAM's brand, KIGAM can promote its brand value by measuring the institution's managerial results from the brand management side and activating its communication. The operation of the KIGAM brand management committee could be considered as an advanced managerial activity of the science and technology research institution from the viewpoint that it develops the institution's character from a pure study-oriented one to a marketing study-centered one. When comparing the research outcomes of the internal public on KIGAM with those of the external public, the degree of confidence, intimacy, and devotion to KIGAM possessed by the internal staff was much higher than the external public. Considering this, KIGAM needs to offer internal opportunities to promote KIGAM's brand through its internal staff.

KIGAM needs to remember that audience reach and persuasive impact are in inverse proportions. In other words, a communication activity with a wide audience reach is weak in terms of persuasive power, whereas communication activity with a narrow audience reach is strong. Also, we need to refer to the research outcome that about 80% of consumers who purchase or use company products or services make decisions about their purchases through stories of experiences or word of mouth from consumers who already use the relevant products and services. Such a phenomenon represents the importance of direct or two-way communication with the public in PR activities. Accordingly, person-to-person communication activity that expands the chances to have direct contact with the public and manages the contact points should be accompanied by mass communication activity. At the same time, not only the public's viewpoints or opinions, including approval and objection, but also the two-way direction that reads their emotion, feeling, and instinct about KIGAM's businesses and gathers relevant feedback should be assured.

KIGAM's the PR activity should be carried out in a direction that shows human-centered power, which stresses the untouchable assets of businesses, including brand, image, and reputation, rather than stressing the hard power that appears on the surface, such as the giantism of the business scale, long-term periods, and the number of projects.

This study has several limitations. First, this study did not deal with brand strategies and the management of many institutions that contribute to domestic science development. Namely, the analysis in this study is limited to KIGAM among the various science-related institutions in Korea. Accordingly, more discussions on the many institutions that contribute to domestic science development should be held, and comparisons of brand strategy and management among these institutions should be included in the discussions. Through comparative analysis, we can look into the brand strategies of each institution and make strategic suggestions to build a power brand in the future. However, this study focused only on the analysis of KIGAM, so that it is impossible to discuss differences with other institutions. Accordingly, we suggest that more concrete brand management strategies be developed through the analysis and discussion of various science institutions in upcoming studies.

In this study, we classified the survey respondents into the internal and external public for the analysis of KIGAM's brand management. The external public group comprised of non-experts had different recognitions and attitudes toward KIGAM according to native variables, including sex, age, and occupation. Accordingly, future studies need to look into the differences of recognition more concretely after considering such native variables. As for the internal public group, we also need to consider differences of recognition according to

gender and working career. In future studies, we need to carefully look into differences of recognition after considering situation variables, including various native variables in the internal and external public. We expect that such detailed analysis will suggest much information for establishing KIGAM's powerful brand in the future.

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